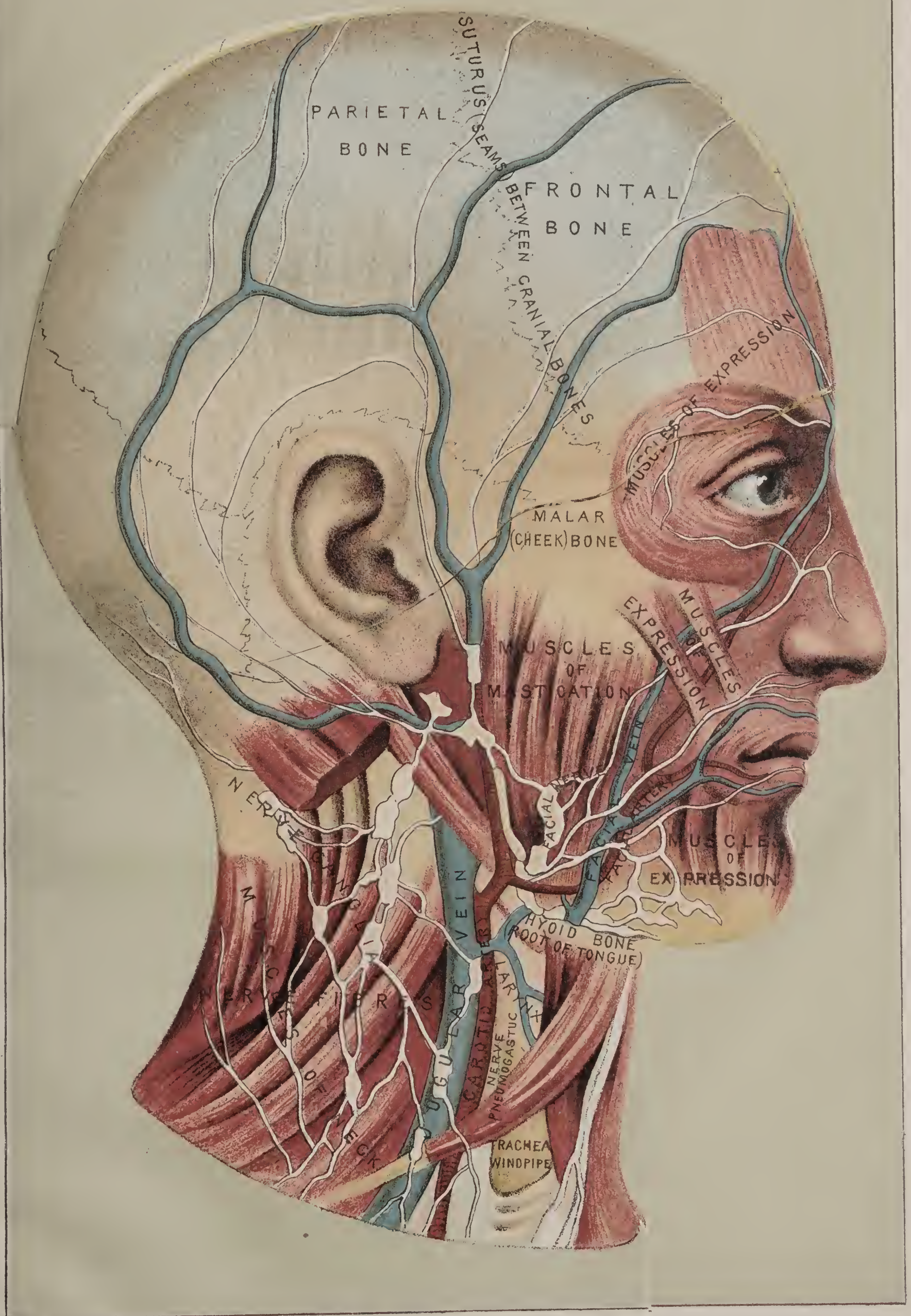


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PARIETAL BONE
SUTURUS (SEAMS) BETWEEN CRANIAL BONES
FRONTAL BONE
MUSCLES OF EXPRESSION
MALAR (CHEEK) BONE
MUSCLES OF MASTICATION
MUSCLES OF EXPRESSION
FACIAL VEIN
FACIAL ARTERY
MUSCLES OF EXPRESSION
HYOID BONE (ROOT OF TONGUE)
JUGULAR VEIN
CAROTID ARTERY
NERVE PNEUMOGASTRIC
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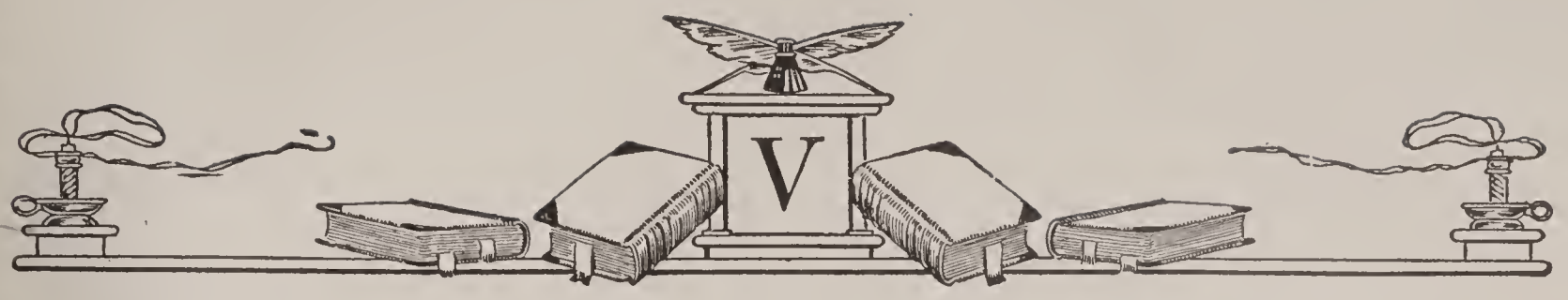
RURIC NEVAL ROARK

Economic Writer, Former President Kentucky State Normal School

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V, the fifteenth consonant and the 22d letter of the English alphabet. The letter was derived from the Phoenician through the Greek and the Roman languages, corresponding to the Roman V. It represents a labial or labio-dental consonant sound and is formed by the junction of the upper teeth and the lower lip, as in *ov, eve,* and *vain.* The sound of *v* is produced in the same way as that of f, but differs from the latter in being voiced, while the sound of *f* is breathed. As a Roman numeral v is used to denote the same value as the Arabic 5 and when a dash is placed above it, as $\bar{V}$, it represents 5,000.

VAAL RIVER COLONY. See **Transvaal.**

VACCINATION (văk-sĭ-nā′shŭn), the art of introducing vaccine matter into the human system with the view of providing protection against smallpox, or to render that disease less severe. The vaccine matter generally used is the so-called vaccine virus, obtained from pustular eruptions on the skin of the teats and udders of cows having cowpox, an acute contagious disease. The common method is to cut the skin slightly with a clean lancet point, usually on the upper part of the arm, and then rub the vaccine matter over the skin containing the scratches. Vaccination pustules formed on another person answer the same purpose. Where the vaccination proves successful, inflamed pustules form the third day. Loss of appetite and slight headaches usually occur the eighth day, and the inflammation begins to decrease the tenth day. A scab forms after the pustules are dried up, which usually disappear the twentieth day and leave a slight scar. Jenner is the discoverer of vaccination.

Considerable disagreement has been common among medical men as to the value of vaccination, some alleging that it is no reliable means of protection, and instead recommend strict observance of sanitary and hygienic laws. It is contended by others that successful vaccination either entirely prevents contagion or greatly lessens the severity of the disease. They recommend that a child be vaccinated at about the fourth month after birth and that subsequent vaccinations be made at an interval of six or seven years. Children are refused admission to the public schools in some countries unless they are previously vaccinated. In 1900 smallpox was epidemic in the United States, Russia, Mexico, France, Germany, and many other countries. It was proven quite conclusively that the disease was most general in sections where vaccination had decreased. Subsequently the health authorities of many cities in the United States ordered general vaccination. In 1901 the authorities of Constantinople made it compulsory to vaccinate, under penalty of a fine.

A notable instance of successful results in the value of vaccination as a protection against smallpox was reported from Porto Rico and the Philippines in 1908, where the disease was epidemic. The government of the United States performed 800,000 vaccinations in these islands and in four months abolished the disease. Formerly the death rate was 6,000 from smallpox, but in the year following the general institution of vaccination no deaths were reported from a large number of districts. This is in practical accord with the experience in Europe in the 18th century, when smallpox was as common as measles. Medical authorities place the death rate from the disease very high in that continent before the value of vaccination was discovered, as high as 15,000,000 in a quarter of a century.

VACUUM (văk′ū-ŭm), a space which is devoid of any material substance. Modern experience bears out the view that an absolute vacuum does not exist in nature. Even as practically applied, it is understood that ether fills the space, termed the vacuum, from which the matter has been removed. The most perfect vacuum that could be obtained up to the last century was the space in a carefully filled barometer tube, called the *Torricellian vacuum.* It is now possible to remove all but about $\frac{1}{120}$ of the air in the receiver of an air pump. In case this is done the air remaining can be exhausted almost entirely by carbolic acid being injected and pumped out several times, after which all traces of remaining air may be removed by moistened caustic potash previously placed in the receiver. The presence of a quantity of sulphuric acid is quite essential in making these experiments. It is now possible

to make an exhaustion so nearly complete that the matter remaining is not sufficient to allow an electric spark to pass through it.

VACUUM PAN, a closed metallic retort which is used for boiling down sirup and in making sugar. However, only a partial vacuum is formed within such a vessel, this being accomplished by connecting it with an exhausting apparatus. The use of the vacuum pan permits the liquid to evaporate and concentrate at a lower temperature and a lower atmospheric pressure than ordinarily. It likewise overcomes the danger of burning the sugar and shortens the operation. Vacuum pans may be used in the manufacture of any substance in which a low temperature is required.

VACUUM TUBES. See **Geissler, Heinrich.**

VAILLANT (vå-yän′), **Marie Edouard,** public man, born at Vierzon, France, in 1840. He studied engineering and medicine in Paris and subsequently pursued courses of instruction in the universities of Tübingen, Heidelberg, and Vienna. In 1870 he returned to Paris, where he was a prominent figure in supporting the commune and officiated as minister of education. At the downfall of the commune he went to London, where he was active in soliciting support for the socialist cause in France, and in 1872 the death sentence was placed upon him. He returned to Paris after the amnesty of 1880, was elected to the municipal council in 1884, and was an active opponent of Jean Marie Boulanger. Subsequently he was twice elected to the house of deputies, in 1893 and 1898, where he attracted attention as an advocate of socialistic measures.

VALDAI HILLS (vål-dī′), an elevated region of hills in western Russia, about 125 miles southeast of Saint Petersburg. Within these highlands are the sources of the Volga, Duna, and Dnieper rivers. The general elevation is about 310 feet above sea level, but Mount Popovagora is 1,095 feet. Immediately west is Lake Ilmen. The region is well wooded and watered. Fine farms are located in the valleys and lower slopes, while the higher altitudes have fine grasses.

VALDIVIA (vål-dē′vē-ä), a city of Chile, capital of a province of the same name, near the mouth of the Calla-Calla River. It has a well-sheltered harbor at Port Valdivia, on the Pacific coast, about sixteen miles east, and is connected with interior points by railways. The streets are regularly platted, but the buildings are quite low. It has a large export trade in hides, lumber, cattle, and minerals. The place was founded by Pedro de Valdivia in 1551. Population, 1918, 10,452.

VALDOSTA (văl-dŏs′tà), a city in Georgia, county seat of Lowndes County, in the southern part of the State, on the Valdosta Southern, the Plant System, and the Georgia Southern and Georgia railroads. The surrounding country produces sugar cane, corn, tobacco, hay, and vegetables. Among the noteworthy buildings are the county courthouse, the high school, the public library, and several churches. The manufactures include cigars, clothing, earthenware, and machinery. Among the general improvements are electric lights, telephones, waterworks, and sanitary sewerage. It was settled in 1859 and incorporated in 1860. Population, 1900, 5,613; in 1920, 10,783.

VALENCIA (vå-lĕn′shĭ-à), a seaport city of Spain, on the Mediterranean Sea, about 200 miles southeast of Madrid. It occupies a convenient site on the Guadalaviar River and has excellent railroad facilities. The streets are narrow and crooked in the older parts, but the newer quarters have broad and handsome thoroughfares and are provided with numerous modern improvements, such as gas and electric lights. It has an extensive system of electric street railways, street pavements, waterworks, and public parks. A broad quay, beautifully improved by avenues of trees, is located along the river. An avenue called the Alameda passes from the quay to the harbor on the Mediterranean. The city is surrounded by fine orchards and vineyards, and through it pass a number of canals and a network of pipes carrying the city water supply. Among the chief buildings is the La Seo Cathedral, a Gothic structure of the 13th century, and near it are a number of chapels. Other buildings of note include the customhouse, several secondary schools, and the university. Valencia is noted for its manufacture of tobacco products, which aggregate 145,000 pounds per year. Other manufactures include glass, leather, linens, silk and cotton textiles, pottery, soap, machinery, clothing, ironware, and musical instruments. It has a large interior and foreign trade in silk, spirits, cereals, and fruits. The fine climate and convenient transportation facilities make it a favorite summer resort. Valencia was a Roman city, but subsequently became a center of Gothic influence, and in 713 was captured by the Moors. In 1812 it surrendered to the French. Population, 1920, 219,034.

VALENCIA, a city of Venezuela, 30 miles south of the Caribbean Sea and about 82 miles southwest of Caracas. It has railroad connections with Puerto Cabello and is situated in a fertile farming and stock-raising region. The streets are regularly platted and substantially improved by pavements, sewerage, and waterworks. About eight miles east of it is Lake Valencia. The manufactures include cotton and woolen goods, pottery, machinery, cordage, tobacco products, and farming implements. Among the noteworthy architectural structures are a number of schools and churches, several government buildings, and numerous hotels and business establishments. It was founded by the Spanish in 1555. Population, 1918, 42,415.

VALENS (vā′lĕns), **Flavius,** Roman Emperor of the East, born in Pannonia about 328;

slain near Adrianople, Aug. 9, 378 A. D. His brother, Valentinian I., proclaimed him Emperor of the East, in 364, and he received as his share of the Roman dominions all of Thrace, Egypt, and Asia. He began reforms in the empire by greatly reducing taxation, but a lack of prudence caused a number of revolts which were aided by the Goths under Athanaric. A peace was concluded in 370 and, when the Huns drove the Goths southward, in 377, the latter were permitted to settle in Moesia, which was a part of the Roman territory. Subsequently the Romans imposed burdensome taxes upon the Goths, which caused a revolt and a decisive battle between Valens and the Goths near Adrianople. The Roman army was cut entirely to pieces and Valens was slain.

VALENTINE (văl'ẹn-tīn), **Basel,** eminent alchemist, who flourished in Germany about the 13th century. Little is known of his early life and it is assumed that he was a Benedictine monk at Erfurt, where he appears to have exercised considerable influence in the convent of Saint Peter. He was diligent in searching for the philosopher's stone, which is reputed to turn everything it touches into gold, and wrote a number of works relating to transmutation. His writings are in the Old German dialect, some of which still remain in manuscript form, but a number have been put into print. Among the best known of the published works are those bearing the titles of "Essential Colors of the Seven Metals," "Twelve Keys of Philosophy," and "Tract Concerning Things Natural and Supernatural."

VALENTINE, or **Valentinus,** a Christian martyr of the 3d century, famous for his piety and acts of charity. Emperor Claudius of Rome caused his arrest and imprisonment and employed Asterius to make an effort to convert him back to idolatry. Valentine received him with great kindness and afterward converted Asterius to Christianity by healing his blind daughter. He suffered martyrdom at Rome in 270, his name being assigned in the calendar to Feb. 14, which is commonly called Saint Valentine's Day. The custom of sending sentimental or comic messages is older than the martyrdom of Saint Valentine. It was long practiced by the Romans on the 15th of February and was associated with the feast called Lupercalia. Anciently it was customary to bestow presents on Valentine's Day, such as garters, gloves, handkerchiefs, and jewelry.

VALENTINIAN I. (văl-ĕn-tĭn'ĭ-ăn), **Flavius,** Roman Emperor of the West, born in Pannonia in 321; died there Nov. 17, 375 A. D. He was the son of Gratianus, a soldier in the Roman army, and under his father received early military training. Julian recognized in him a military leader of great courage and capacity, but his contempt for paganism caused the emperor to banish him in 362. He was restored to favor the following year and given command of an army in the East, where he became highly distinguished, and on the death of Jovian, in 364, was chosen emperor by the army stationed at Nicaea. One of his first important acts was to name his brother Valens as Emperor of the East, while he governed Italy, Spain, Gaul, Germany, and Northwestern Africa. His reign of eleven years was wise and able, but there were a number of incursions from Germany, chiefly by the Saxons, Burgundians, and Alemanni. He not only defended the Roman possessions, but made notable improvements, encouraged industries, and reformed the civil service. He died from an attack of apoplexy while treating with ambassadors from Germany. His daughter Galla became the wife of Theodosius I. and his two sons, Valentinian and Gratianus, succeeded him in the government.

VALENTINIAN II., Flavius, Roman Emperor of the West, born in 371; died in 392. He was but four years of age at the death of his father, Valentinian I., while his elder brother Gratianus was seventeen years old. The two succeeded their father in the government, with their residence at Milan. Gratianus retained the Trans-Alpine provinces, while Valentinian received Italy and parts of Africa and Illyricum, the latter being assisted by his mother, Justina. Gratianus died in 383 and his army in Britain rallied to the support of Maximus, who, in 387, invaded Italy. Valentinian and his mother fled to Thessalonica, where they found a friend in Theodosius, the husband of Galla and the Emperor of the East. Theodosius sent a large army into Italy, which defeated Maximus in a decisive battle, thus restoring Valentinian to the throne. Though a liberal sovereign, he was slain by Arbogastes, a Frank commander in the army, four years after his restoration.

VALENTINIAN III., Placidius, Roman Emperor of the West, born in 419; slain March 16, 455. He was the son of Constantius III. and of Placida, the daughter of Theodosius and Galla, and in 425 was declared Emperor of the West by Theodosius II. In the first part of his reign he was assisted by his mother. His government of thirty years was both weak and corrupt, witnessing a rapid decadence of Roman power. In this period occurred the great barbaric invasions under Attila and Genseric, which were long staid with a powerful hand by the Roman general Aëtius. The Vandals under Genseric conquered Africa, but Attila was finally defeated by Aëtius, though the jealousy of Valentinian caused him to kill the latter in 454. The faithful friends of Aëtius joined Maximus in opposition to Valentinian, and he was slain while attending games in the Campus Martius. His death witnessed the extinction of the family of Theodosius.

VALENTINUS (văl'ĕn-tī-nŭs), eminent Christian theologian, the most distinguished before Origen, who was ore of his students. Lit-

tle is known of his life, but it is certain that he was born in Egypt and quite probably received his education in Alexandria. He came to Rome about 138, where he lived in the time of Pius (140-155), and was a contemporary of Anicetus (155-166). Valentinus regarded heathenism a preparatory stage of Christianity and combined Greek philosophy with the teachings of the Gospel, treating the latter as the keynote of Greek science. He was the author of several epistles and the founder of a sect known as the *Valentinians.* Though less advanced in learning than Origen, he surpassed him in the style of thought and in the power of perception. He died at Rome or in Cyprus about 160 A. D. He is considered the founder of gnosticism, a system of philosophy that occupied a middle ground between paganism and Christianity. See **Gnosticism.**

VALERIAN (vȧ-lē′rĭ-ȧn), a genus of plants native to Europe, many of which are cultivated in all the continents. About 180 species have been described, including both annual and perennial plants. Most of these species have fleshy roots, woody fibers, and yield gummy and resinous substances. The alpine valerian is used for perfuming baths and as a substitute for spikenard. Several of the species are valuable for their medical property, which is derived from the root as a volatile oil, known as the *oil of valeria.* Preparations of it are used in treating hysteria, chorea, and nervous irritability. Cats are peculiarly attracted by the smell of valerian. Wild species are found in some parts of North America, especially in the swamps of New Brunswick, Michigan, and Vermont.

VALETTA (vȧ-lĕt′tȧ), or **La Valetta,** a seaport city of Malta, capital of that island, situated due south of Sicily. It is strongly fortified and has a large and commodious harbor. The site of the city is on an elevated neck of land, about two miles long, and at its extreme point is a powerful lighthouse. The streets are platted with considerable regularity, crossing each other at right angles. They are improved with stone pavements, electric lights, waterworks, and several fine squares. Among the chief buildings are the governor's palace, the Cathedral of Saint John, and a number of schools and churches. It has several monuments erected to Italian leaders. The city has a library of 60,000 volumes and a university. The water supply is obtained by an aqueduct nine miles long. It is so named from John de la Valette (1494-1568), grand master of the Knights of Saint John, who successfully defended the island of Malta against the Turks in 1566. Among the industries of the city is shipbuilding. It has manufactures of wine, cotton and silk textiles, pottery, and clothing. It is the seat of a considerable trade in grain, coal, wine, and fruits. Population, 1916, 62,826.

VALHALLA (văl-hăl′lȧ). See **Walhalla.**

VALKYRIES (văl-kĭr′ĕz), in Scandanavian mythology, the maidens who attended upon Odin, by whom they were sent to the field of battle to choose those who were to be slain and to turn the tide of battle. They were adorned with golden ornaments and bore the souls of the brave to Walhalla, where they served the heroes with mead from the drinking horn. The number of these maidens is usually stated to have been nine, though more are named in the *Elder Edda.* In the later writings they are associated with the clouds, usually the white clouds and those that indicate the approach of storm.

VALLADOLID (väl-yȧ-~~th~~ō-lĕ~~th~~′), a city of Mexico, in the state of Yucatan, 88 miles southeast of Merida, with which it is connected by railway. It occupies a fine site in the center of a fertile region, which produces cereals, sugar cane, and tobacco. The noteworthy buildings include the city hall, the post office, the Franciscan convent, and the Jesuit College. Among the manufactures are cotton and woolen goods, utensils, tobacco products, clothing, and earthenware. The climate is the best found in Yucatan, hence it is a favorite place for invalids. Population, 1916, 15,206.

VALLADOLID, a city in Spain, capital of the province of Valladolid, 98 miles northwest of Madrid. It is situated on the Pisuerga River, a tributary of the Douro, and has railroad connections with the leading interior and seaport cities of the Iberian peninsula. The climate is genial and healthful, the sky is generally cloudless, and surrounding it is a region noted for its abundance of live stock, cereal crops, and vegetables. Its chief structures include the Plaza de Toros, or bull arena, having a seating capacity for 10,000 persons, and a number of schools, churches, hospitals, and public buildings. It has remains of several fine palaces. The streets are paved and otherwise improved, and within recent years many of the older buildings have given way to fine business blocks and beautiful residences.

Valladolid is noted as an industrial center. Among the principal manufactures are silk and cotton textiles, paper, jewelry, woolens, perfumery, pottery, clothing, and machinery. It has a large trade in live stock and grain, considerable quantities being transported by railway and by navigation on the Douro. Valladolid was known as *Pincia* in the time of the Romans. The Moors called it *Belad-Walid,* and after their expulsion it was occupied by Ordono II. of Leon. Charles V. improved it by constructing many beautiful buildings and palaces, when it had about 100,000 inhabitants. It began to decline in 1560, when Madrid became the only residence of the Spanish sovereigns. It still maintains a university, an institution that has flourished nearly six centuries. Population, 1920, 67,742.

VALLANDIGHAM (văl-lăn′dĭ-gȧm),

Clement Laird, public man, born at New Lisbon, Ohio, July 29, 1820; died June 17, 1871. He attended Jefferson College, Pennsylvania, taught in the schools of Maryland, and in 1842 was admitted to the bar in Ohio. Soon after he was elected to the State Legislature and was chosen a member of Congress as a Democrat in 1856. While in that body he became known as an extreme advocate of state rights. Both in Congress and after retiring, in 1863, he severely criticised the administration of Lincoln, which ultimately caused his arrest and sentence to prison in Fort Warren. The sentence was soon changed by Lincoln to deportation across the Confederate lines, whence he went to the Bermudas and later to Canada. His party nominated him for Governor of Ohio in 1863, but he was defeated by a large majority. Later he took part in the organization of the Knights of the Golden Circle, an organization that was friendly to the Confederacy. His death resulted from the accidental discharge of a pistol at a trial, while he was illustrating his theory of how a murder had been committed.

VALLEJO (vȧl-yā′hō), a city of California, in Solano County, on the Bay of San Francisco, 26 miles northeast of San Francisco. It is on the Southern Pacific Railroad and is an important shipping point. On Mare Island, near the city, is the most important United States naval yard on the Pacific coast. Among the principal buildings are the high school, the Carnegie library, the Sailors' Club House, the Orphans' Home, and the Saint Vincent's Academy. The surrounding country is farming and fruit growing. It has manufactures of ironware, machinery, pottery, lumber products, engines, sailing vessels, and farming implements. The municipal improvements include pavements, waterworks, and electric street lighting. It has a growing trade in farm produce and merchandise. Population, 1920, 16,853.

VALLEY, a tract of land bordered by hills or mountains and usually drained by a stream. A valley is properly a strip of low land between hills or mountains, but in a larger sense the term is applied to the entire basin of a river, as the valley of the Nile and the valley of the Mississippi. Valleys are said to be *transverse* when they run across a range of mountains, and those that extend parallel to the principal ranges are termed *longitudinal.* Transverse valleys are usually narrow and have steep sides. Where they occupy high altitudes, as in the Alps, they are known as *passes.* The Simplon Pass of Switzerland and the Kabul Pass in the Himalayas are noted instances. On the other hand, transverse valleys in low altitudes are termed *water gaps,* of which the Delaware Water Gap is an instance.

Erosion is the chief agency in the formation of a valley. Where the rocks decay and are acted upon by the frost, the erosion is more rapid, especially if the running stream has a swift current. Valleys formed in this way were originally narrow and bordered by steep walls, but the lapse of time caused them to be widened so as to form level tracts on one or both sides of the stream. In some instances the cause of valleys is assigned to the upheaval and depression of the crust of the earth. Such action is said to be volcanic, but valleys formed in this way are usually much shorter than those resulting from the action of streams. The action of glaciers gives rise to glacial valleys, such as the fiords of Norway and the firths and lochs of Scotland. Many of such formations are due to the agency of glaciers in the remote past.

VALLEY CITY, a city of North Dakota, county seat of Barnes County, 58 miles west of Fargo. It is situated on the Sheyenne River, on the Northern Pacific, and on the Minneapolis, Saint Paul and Sault Sainte Marie railways. The surrounding country is fertile and produces large quantities of wheat, flax, and vegetables. Among the noteworthy buildings are the county courthouse, the high school, a number of churches, and a State normal school. The enterprises include flouring mills, grain elevators, and machine shops. Electric lighting, waterworks, and sewerage are among the public utilities. It has a large trade in farm produce and merchandise. Near the city is a large double-track viaduct of the Northern Pacific Railroad. This structure was built in 1906, at a cost of over $1,000,000, has a height of 164 feet, and is about 4,000 feet long. Population, 1905, 4,059; in 1920, 4,686.

VALLEYFIELD, a port city of Quebec, in Beauharnois County, thirty miles southwest of Montreal. It is situated on Lake Saint Francis, the Saint Lawrence River, the Beauharnois Canal, and the Grand Trunk and other railways. Opposite the city, on the north side of the river, is Coteau Landing. The chief buildings include a college, the cathedral, the public hospital, and the Windsor Hotel. Among the manufactures are cotton goods, flour and grist, paper, and machinery. The city has fine water power, electric lights, sewerage, and waterworks. Population, 1901, 11,055; in 1921, 9,449.

VALLEY FORGE, a village of Pennsylvania, in Chester County, 24 miles west of Philadelphia, on the Schuylkill River and the Philadelphia and Reading Railway. It is famous as the place where the American army of 11,000 men under Washington camped in 1777, after the battles of Brandywine and Germantown. The object of camping at this place was partly to protect Congress, which was then in session at York, Pa., and partly to be in a place where its defense would be aided by the hilly condition of the site during the winter. Want of sufficient clothing and food caused great suffering among the men, owing to the incapacity of the commissary department, and

many died from hunger and cold. However, Baron Steuben, who had come from Germany to assist the Americans, rendered valued services by bringing the army up to a better discipline and greater efficiency for service. Washington abandoned the camp on June 18, 1778, and reoccupied Philadelphia.

VALLOMBROSA (väl-lŏm-brō'sȧ), a famous abbey of Italy, situated in a valley between the Apennines of Tuscany, about fifteen miles east of Florence. In the vicinity are fine groves of chestnut, fir, beech, and mulberry trees. It dates from 1038, when Saint Giovanni Gualberto founded a house of monks subject to the rule of Saint Benedict. The chief building was erected in 1637, but, as the monastery was suppressed in 1863, it is at present occupied by the Royal Academy of Forestry, which was opened in 1869. The abbey of Vallombrosa is mentioned by Milton in "Paradise Lost."

VALMY (väl-mē'), a village of France, in the department of Marne, 35 miles southeast of Rheims. It is famous as the scene of a battle on Sept. 20, 1792, when a German army under the Duke of Brunswick made an attack upon the French under Dumouriez and Kellermann, but was repulsed. The engagement is frequently spoken of as the cannonade of Valmy, owing to the bravery displayed by the assailants under a furious cannonade. It is classed as one of Creasy's "Fifteen Decisive Battles of the World," owing to the fact that it was the first triumph of the new republic established in France.

VALOIS (vȧl-wä'), **House of,** an eminent dynasty of France. It was a branch of the Capetian dynasty, which possessed the throne from 1327 to 1589. The early monarchs of this line were able and valiant rulers. They successfully resisted the incursions of the English, established the supremacy of the crown over the nobles, and gave France an eminent position among the nations of Europe. Francis I. was one of the noted sovereigns of the house of Valois and was distinguished for his firm disposition and remarkable ability, but his successors were less fortunate and under their government the country became distracted by the rise of powerful nobles, internal dissent, and religious disturbances. Historically, the dynasty dates from 1285, when Philip III. assigned to his younger son Charles the county of Valois, a region now included in the departments of Aisne and Oisne. The Capet dynasty becoming extinct in 1327, the eldest son of Charles of Valois ascended the throne of France as Philip VI., thus founding the Valois dynasty. The sovereigns of the Valois line include the following. Philip VI. (1327-1350); John the Good (1350-1364); Charles V. (1364-1380); Charles VI. (1380-1422); Charles VII. (1422-1461); Louis XI. (1461-1483); Charles VIII. (1483-1498); Louis XII. (1498-1515); Francis I. (1515-1547); Henry II. (1547-1559); Francis II. (1559-1560); Charles IX. (1560-1574); and Henry III. (1574-1589). The dynasty was succeeded in the last mentioned year by the house of Bourbon.

VALPARAISO (väl-pȧ-rī'sō), a city in Indiana, county seat of Porter County, 43 miles southeast of Chicago, Ill., on the Pennsylvania, the Grand Trunk, and the New York, Chicago and Saint Louis railroads. It is surrounded by a fertile farming and dairying country. The noteworthy buildings include the county courthouse, the high school, the city hall, and the Saint Paul's Academy. It is the seat of the Northern Indiana Normal School, an important educational institution of higher learning, having departments of normal training, law, engineering, music, languages, and business training. It is attended by about 1,500 students. The city has manufactures of flour, ironware, clocks, cigars, lumber products, clothing, machinery, and farming implements. It has a growing trade in farm produce, fruits, and merchandise. The place was settled in 1826 and incorporated in 1856. Population, 1900, 6,280; in 1920, 6,518.

VALPARAISO, a city of Chile, on a large bay of the Pacific Ocean, 88 miles northwest of Santiago. It is finely located on the Bay of Valparaiso, on which it has a large and safe harbor, and ranks as the largest city and commercial emporium of the republic. Several railroads connect it with a number of cities on the Pacific coast and a transcontinental line furnishes communication with Buenos Ayres and other cities on the Atlantic seaboard. The chief buildings include the customhouse, the union railway depot, several fine churches and schools, and several institutions of secondary learning. It is the seat of a number of hospitals and charitable institutions, several seminaries, and a number of scientific and educational associations.

Valparaiso is one of the leading industrial centers on the Pacific coast of South America. The manufactures include tobacco products, clothing, earthenware, spirituous liquors, vehicles, sugar, machinery, and farming implements. Its interior and foreign trade is important, the commodities including chiefly lumber, minerals, live stock, hides, sugar, cereals, wool, and wine. A chain of forts constructed in 1866 defends the city. Among the general improvements are electric lights, waterworks, and electric street railways. A destructive earthquake visited the region in 1822 and again in 1906. In the latter year a thousand people were killed and 75,000 were rendered homeless. Valparaiso was founded by the Spanish in 1544. Hostilities between President Balmaceda and insurgents occurred at Vina del Mar, three miles northeast of Valparaiso, in 1891. In 1892 a force of Chileans made an attack upon the American ship *Baltimore* in its harbor, but the difficulties were adjusted by the payment of an indemnity. Population, 1918, 196,348.

VALUE (văl′ū), in economics, the worth of an object estimated by any standard of purchasing power, such as the market price or the amount of money considered equivalent to the utility or cost of it. It has been defined as the estimate of the amount of sacrifice necessary to attain an object that may be desired. However, *utility* and *scarcity* are two fundamental factors that enter into the matter of determining the value of any object, and when they are considered together they constitute the so-called *law of supply and demand*. By utility is meant the qualities in objects that make them desirable. Any object that does not possess utility is not considered of value, since no one would care to make a sacrifice unless the object gratifies some desire. Scarcity may be defined as the absence of an abundance, or as a limited supply when the demand is great, and under such conditions the value becomes proportionately higher. In general, value is spoken of as the price of an article and money is termed the *measure of value*. See **Wealth.**

VALVE (vălv) in mechanics, a movable piece in a tube, fitted to act like a door or gate to permit the passage of a liquid, whether in the form of gas, steam, water, or solutions. The valves are variously constructed, depending upon the uses they are to serve. In general, valves may be classed as those operated by hand, by independent mechanism, by the movement of machinery, and by the action of a fluid. *Sliding-valves* open parallel to the seat, *lift* or *puppet valves* rise perpendicularly, and *flap-valves* rotate in an opening. Pumps and steam boilers are fitted with *self-acting valves,* since the water or steam open or close them according to the pressure of the fluid upon their surface. Sliding-valves, such as are used in the cylinder of a steam engine, are controlled by some external force, the opening and closing having the effect of regulating the admission or escape of steam.

VÁMBÉRY (väm′bā-rē), **Arminius,** author and statesman, born in Duna-Szerdahely, Hungary, March 19, 1832. He studied at Pressburg, where he became distinguished as a student of foreign languages, and in 1848 took part in the national revolution. Subsequently he settled in Constantinople, where he studied Oriental languages, and afterward made extensive tours through Asia Minor, Persia, and Turkestan. As a means of protection he traveled in the disguise of a dervish, thus enabling him to visit regions otherwise unsafe for Europeans. In 1864 he became professor of Oriental languages at the University of Budapest and subsequently took an efficient part in opposing the Russians in the East. His writings include "Travels and Adventures in Central Africa," "Mohammedanism in the Nineteenth Century," "History of Bokhara," "Primitive Civilization of the Turko-Tartars," "Future Contest for India," and "German-Turkish Dictionary." He died Sept. 15, 1913.

VAMPIRE (văm′pīr), a so-called demon of Southeastern Europe, which is believed by the superstitious to roam about at night in search of persons, whose blood it sucks. The superstition is of Eastern origin and still prevails among the more ignorant classes occupying the region tributary to the Lower Danube. The Lamias mentioned in Greek mythology are similar to the vampire. It was the common belief in the Middle Ages that persons who died under the ban of the church became vampires and were sent forth by the devil to devour the hearts and souls of those with whom they came in contact. New vampires were thought to spring from those killed by other vampires. Some believed that heretics and wizards became vampires at their death. To end the career of a vampire, it was necessary to discover its grave and, after disinterring the corpse, it was pierced with a thorn stake and burned. The belief prevailed that vampires were fond of the blood of both women and men, and that they were especially eager to secure subsistence by destroying youths.

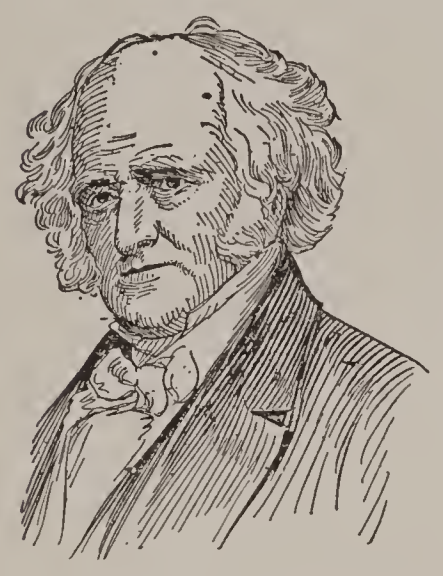
VAMPIRE BAT, the name of a class of small bats, so called from their habit of obtaining subsistence by sucking blood from larger animals. They pierce the skin by a pair of prolonged teeth and usually attack the victim while asleep. The ears are large, the gullet is fitted only for the passage of liquid food, and the wings have a large expanse considering the size of the animal. These bats are pests in some sections in that they attack domestic animals, such as cattle and horses, and have been known to fasten themselves to man during sleep. The common vampire bat is found in the region from Central America to Chile. However, several species of so-called vampire bats of South America are not blood-sucking but, instead, feed upon fruit.

VAN (vän), a fortified city of Asiatic Turkey, situated on the eastern shore of Lake Van, 138 miles southeast of Erzeroum. It is the chief city of the vilayet of Van, one of the most fertile regions of Asiatic Turkey. Lake Van is about 5,400 feet above sea level and at the city of Van has a depth of 80 feet, thus affording excellent anchorage for sailing vessels. The lake is 80 miles long and 40 wide and has an area of 1,350 square miles. It has no outlet to the sea and its waters are salty. Van is noted for its numerous bazaars, mosques, and Armenian churches, though the streets are not well paved and are quite narrow. Among the manufactures are cotton and woolen goods, earthenware, carpets, and implements. Many caravans visit the city, penetrating thence into Persia, Arabia, and Asia Minor. In the vicinity are many ruins dating from the time of Xerxes. The Asiatic people have a tradition that Semiramis founded Van, but it was named from Van, King of Armenia, who governed the region from 371 to 351 B. C. Population, 1916, 32,645.

VANADIUM (vȧ-nā′dĭ-ŭm), a metallic **ele-**

ment found only in combination with other minerals, discovered by Sefstrom in 1830. It occurs in vanadinite, the vanadate of lead; in volborthite, a copper vanadate; and in a number of others. The metal forms a monoxide with oxygen and combines with platinum to form an alloy. It melts at a very high temperature. Vanadium is used largely with aniline as a dye, for a black pigment, and as the basis of a black ink.

VAN BUREN (văn bū′rẹn), **Martin,** eighth President of the United States, born in Kinderhook, N. Y., Dec. 5, 1782; died there July 24, 1862. He was the eldest son of Abraham Van Buren, a descendant from the early Dutch settlers of New York. After studying the rudiments of English and Latin in his native town, he entered a law office in New York City, and in 1803 was admitted to the New York bar. He was associated in the law practice at Kinderhook with James I. Van Alen, and in 1807 married Hannah Hoes. In politics a Democrat, he supported Thomas Jefforson in his national policy, and in 1812 became a member of the New York State senate.



MARTIN VAN BUREN.

Van Buren was noted as an adroit party manager and was styled in his time "The Little Magician." In 1816 he removed to Albany, though still a member of the State senate, and there formed a law partnership with his lifelong friend, Benjamin F. Butler. He was appointed regent of the University of New York in the same year and in 1821 was elected United States Senator, serving in the same year on a committee to revise the State constitution. He served in the United States Senate until 1828, when he resigned to become Governor of New York. A devoted supporter of Andrew Jackson and a statesman of eminent ability, he was appointed Secretary of State, but resigned from Jackson's Cabinet in 1831 to become minister to England. The appointment was made in the recess of Congress and when the Senate met, in 1832, that body refused to confirm his nomination, Vice President John C. Calhoun casting the deciding vote against him.

In 1832 Van Buren was elected Vice President of the United States, thus becoming the presiding officer of the body that rejected him as foreign minister. The Democratic party nominated him for President in 1836. He received 170 votes in the electoral college out of 294, but had only 25,000 majority of the popular vote. He was nominated for a second term in 1840, but was overwhelmingly defeated by Gen. William Henry Harrison, the hero of Tippecanoe, the latter receiving 234 electoral votes, while Van Buren received only 60. The majority for Harrison in the popular vote was about 140,000. His name was presented to the Democratic national convention at Baltimore in 1844 as a candidate for the Presidency, but James K. Polk received the nomination. The Free Soil party nominated him in 1848, when he received only 291,263 of the popular votes. However, he did not secure any support in the electoral college. In 1852 he supported Franklin Pierce and in 1856 supported James Buchanan.

Van Buren was a natural leader of public opinion, a man of generous soul and fine scholarship, and had a large circle of personal friends. The panic of 1837, an outgrowth of excessive speculations, the independent treasury system, and the preëmption law are among the prominent events of his administration. He is the author of a work entitled "Inquiry into the Origin and Course of Political Parties."

VANCE, Zebulon Baird, statesman, born in Buncombe County, North Carolina, May 13, 1830; died April 14, 1894. He became United States Senator in 1879, in which office he took high rank until his death.

VANCOUVER, county seat of Clarke County, Wash., 6 miles north of Portland, Ore., on the Columbia River and on the Northern Pacific and other railroads. It has steamboat communication, electric railways and lumber mills. It has a fine courthouse, high school and public library. Population, 1920, 12,637.

VANCOUVER (văn-kōō′vẽr), an island off the Pacific coast of North America, lying west of British Columbia and northwest of the State of Washington. It is separated from the former by Queen Charlotte Sound and the Strait of Georgia and from the latter by the Strait of Juan de Fuca. The length from southeast to northwest is about 285 miles; width, from 15 to 70 miles; and area, 12,760 square miles. The surface is essentially a mountain range, with a number of fertile valleys and a narrow coast. Splendid forests are abundant in the valleys and mountains. The mountains rise to heights ranging from 3,500 to 6,975 feet. Mount Albert Edward, height 6,975 feet, is the highest summit. It has an abundance of drainage, but the streams are small and unimportant. The shores are largely precipitous and rocky and the coasts are indented by numerous inlets.

Many islands abound off the eastern and western shores, most of which are rocky and well timbered. The chief minerals include gold, copper, iron ore, and coal, though the last mentioned is worked most extensively. Mining, lumbering, and fishing are the leading industries. Agriculture and stock raising are pursued successfully. The salmon fisheries are the most important, though other fish abound. It has a considerable fur trade, including the skins derived from the otter, marten, mink, beaver, sable, bear, deer, and seal. The chief soil prod-

ucts include cereals of all kinds, fruits of the Temperate Zone, and vegetables. Among the domestic animals grown chiefly are horses, sheep, cattle, and poultry. The excessive rainfall converts the short streams into torrents, especially in autumn and spring. Vancouver has a climate greatly tempered by the Pacific, its temperature seldom falling below 15° and rarely rising above 85°.

The island is so named from Capt. George Vancouver (1758-1798), who discovered it in 1792, though it had been visited by Juan de Fuca in 1592. Captain Cook surveyed a part of the coast, in 1778, and Captain Vancouver soon after prepared a map of it and of the waters separating it from the mainland. The island was long claimed by the United States, out it has been a British possession since 1846. In 1859 it was made a colony, but it was united with British Columbia in 1866, of which Province it still forms a part. Victoria, on the southern extremity of the island, is the capital of the Province. A railway extends from Victoria to Wellington and the coal fields in the vicinity of Nanaimo. Esquimalt, near Victoria, has a fine harbor and is a station of the royal navy. The inhabitants include 10,000 Wakash Indians.

VANCOUVER, the largest city of British Columbia, county seat of New Westminster County, sixty miles northeast of Victoria. It has a fine harbor on Burrard Inlet, an extension



of the Strait of Georgia, and is the western terminus of the transcontinental line of the Canadian Pacific Railway. The site occupies a rolling tract of land, which rises gradually from the harbor. The streets are platted regularly and improved with substantial pavements. Intercommunication is by a system of electric railways, with which are connected lines that extend to Steveston, New Westminster, and other towns. Stanley Park is a fine public resort and contains much natural scenery of great beauty, including a remnant of primeval forests, through which have been constructed fine roads and pathways. Near the entrance to the harbor is Siwash Rock, one of the most picturesque features of the rugged scenery that beautifies the channel between the city and the open sea. Other parks include East End and False Creek, both beautiful and popular public grounds. The business section lies near the harbor, extending for some distance along the margin of the channel, and beyond it is the residential part of the city.

Much of the architecture is of brick and stone and the larger structures are modern and substantial. The depot of the Canadian Pacific Railroad is centrally located near the harbor and is one of the largest buildings in the city. Other structures of note include the courthouse, the post office, the public library, the Vancouver and the Badminton hotels, and a number of fine schools and churches. It is the seat of Vancouver College, which is affiliated with McGill University at Montreal. Other institutions include Saint James's College, several hospitals, and the military station maintained by the government. The public schools are well organized and generally attended and carry courses from the primary grades to those usually provided in the high schools.

The harbor is sufficiently deep for the admission of the largest seagoing steamers. Regular steamship lines are maintained with Victoria, Seattle, and ports in South America and Asia. The surrounding country produces large quantities of fruits, cereals, lumber, and live stock, hence contributes largely to the trade in produce as well as in minerals and merchandise. It has extensive railroad machine shops. Among the manufactures are lumber and lumber products, furniture and glass, sugar and canned fruits, carriages and wagons, malt and distilled liquors, clothing, brooms, vinegar, soap and cigars. The city has a large wholesale and jobbing trade, both inland and coastwise.

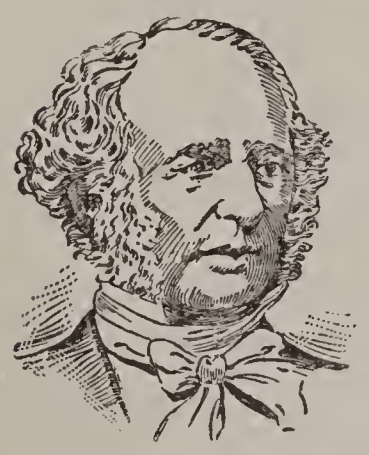
The site of Vancouver was an unbroken forest in 1885, when the officials of the Canadian Pacific Railway decided to make it their western terminus. Many buildings were erected immediately after this decision was reached and the town was platted the following year. A fire destroyed the larger part of it soon after, but it was rebuilt rapidly and has had a remarkable growth since. Population, 1901, 28,895; in 1921, 117,217.

VANDALS (văn'dạlz), a brave and warlike people of ancient Germany, who were confined chiefly to the region between the Oder and Vistula rivers. In the 2d century A. D., they occupied the region of the Riesengebirge, in southern Germany, and in the following century joined the Goths in making incursions into the Roman province of Dacia. They were permitted by Constantine to make settlements in Pannonia, where they dwelt in peace for sixty years and became Arian Christians. In the 5th century they formed an alliance with the Alani, Suevi, and other Germanic tribes and entered upon a successful invasion of Gaul, where they held sway for three years. Subsequently they

invaded the Spanish peninsula, and in 429 an army of 75,000 under Genseric crossed the Strait of Gibraltar into Africa. There they came in contact with the Roman army of Valentinian III., with whom they made a short truce, but Genseric conquered Carthage in 435. A peace treaty concluded with Rome recognized the authority of the Vandals over Northwestern Africa, Corsica, Sardinia, and part of Sicily.

The Vandals, still eager for conquest, invaded Italy in 455 and soon after captured Rome. On the death of Genseric, in 477, the leadership of the Vandals passed to his son, Hunneric, who warred against the Moors and persecuted the Catholics. Subsequent leaders were less energetic, owing largely to the influence of the tropical climate of Africa, and they were finally subdued by a Roman army under General Belisarius in 533, in the reign of Emperor Justinian. Gelimer, the last African leader of the Vandals, was captured in Numidia and in 534 was carried to Constantinople. The remaining remnant of the Vandal army was sent along with Roman soldiers to participate in the wars against Persia. *Vandalism* is a term used to express hostility to art and literary treasures and to describe destruction or defacement of property, the word originating from the practice of the Vandals. Several writers assert that some of the Berber tribes of North Africa are direct descendants from the Vandals, basing their statements upon the circumstance that they have blue eyes and blonde hair.

VANDERBILT (văn'dĕr-bĭlt), **Cornelius,** capitalist and philanthropist, born near Stapleton, Staten Island, N. Y., May 27, 1794; died in New York City, Jan. 4, 1877. He descended from a family of Dutch settlers, who reached New York in the early history of colonization. Though largely deprived of school advantages, he showed remarkable skill as a financier and business man. In 1810 he began to run a boat to carry vegetables and passengers to New York City, and by judicious management amassed $10,000 by the time he reached the age of 23 years. Thomas Gibbons employed him as captain of a steamboat plying between New York and New Brunswick, N. J., where his wife managed a hotel and lodging house. In 1829 he left the service of Thomas Gibbons to build and manage steamboats on his own account, instituting several successful lines on the Hudson River and the waters surrounding Long Island. He established a line to New Orleans and San Francisco, in 1851, and two years later founded an ocean steamship line to Havre, France.



CORNELIUS VANDERBILT.

When the Civil War broke out, he gave up the line to France and presented the United States government with the steamship *Vanderbilt,* a fine vessel costing about $850,000. After the close of the Civil War he withdrew his investments in steamship lines to place his capital in railroad stocks. This was the beginning of his vast fortune and leadership in railroad enterprises. He secured control of a number of railroads and established the New York Central and Hudson River Railroad, an important and profitable line. His control extended over 2,000 miles of railroad lines in 1873. He gave $50,000 to purchase the Church of the Strangers in New York City and appropriated $1,000,000 to found the Vanderbilt University (q. v.).

VANDERBILT, Cornelius, capitalist, son of William Henry Vanderbilt, born at New Dorp, N. Y., Nov. 27, 1843; died Sept. 12, 1899. He was educated privately and began his business career as a banking clerk in New York City. In 1865 he took a position with the New York and Harlem Railroad Company, of which he was treasurer a number of years. He was made chairman of the board of directors of the New York Central Railroad in 1886, and for many years was associated in an official way with numerous railroad corporations. Besides extending aid to the Vanderbilt University, he was a liberal patron of Yale University and several other institutions.

VANDELBILT, William Henry, son of Cornelius Vanderbilt, Sr., born at New Brunswick, N. J., May 8, 1821; died Dec. 8, 1885. He attended a grammar school and later received private instruction. At the age of eighteen years he became a bank clerk and in 1864 was associated with his father in the management of the New York and Harlem Railroad. As a business man he was singularly successful and his energies were devoted to the development of the Vanderbilt system of railroads. In 1877, at the death of his father, he became president of the New York Central and Hudson River lines. These lines were soon closely affiliated in business with numerous western railways, including the Lake Shore and Michigan Southern and the Chicago and Northwestern railroads. He made many gifts to Vanderbilt University and other institutions and paid the expense of moving the Egyptian obelisk to Central Park, New York City.



WILLIAM HENRY VANDERBILT.

VANDERBILT, William Kissam, capi-

talist, son of W. H. Vanderbilt, born on Staten Island, N. Y., Dec. 12, 1849; died July 22, 1920. He received an academic education and later studied at Geneva, Switzerland. After returning to America, he took up the work of a clerk in a railway office. He was made vice president of the New York Central Railway, in 1877, and in 1883 became chairman of the board of directors of the Lake Shore and Michigan Central Railway. Later he was prominent as a member of the board of directors of numerous railroads and was associated with the Pullman Company and the American Horse Exchange. He erected a fine building for the benefit of his railway employees and contributed liberally to charities.

VANDERBILT UNIVERSITY, an institution of higher learning at Nashville, Tenn., which owes its foundation to a gift of Cornelius Vanderbilt of New York. The first donation, made in 1873, amounted to $500,000, but the entire gift of Mr. Vanderbilt was $1,000,000. W. H. Vanderbilt, son of the founder, made gifts at various times that amounted to nearly half a million dollars. Later substantial contributions were made by Cornelius Vanderbilt, grandson of the founder, and by W. K. Vanderbilt. The institution has been the recipient of donations from other parties, notably from citizens of Nashville, including the gift of about $100,000 made by Mrs. Mary J. Furman for the erection of a chemical laboratory.

Vanderbilt University opened its doors in 1875. At present it is organized in seven departments; namely, academic, engineering, biblical, law, medicine, dentistry, and pharmacy. Most of the university work is done on the campus, a tract of 80 acres in the western part of Nashville, which is far-famed for its beauty of situation. The campus is occupied by a number of university buildings, homes for some of the faculty, and athletic grounds. It has a well-equipped library with about 65,000 volumes. The university is noted for its high standard of admission and strict requirements for degrees. About 900 students are enrolled annually. The list of alumni numbers nearly 5,000. At present the total endowment exceeds $1,500,000, while all the property has a valuation of more than $4,500,000.

Vanderbilt University has exercised a wide influence over the institutions of the South in the matter of scholarship and in athletics. It has influenced the organization of the Southern Association of Schools and Colleges, which is intended to promote a high standard of college work with its requirements for admission. Another organization, the Southern Intercollegiate Athletic Association, was originated in this institution and has had a wide influence in promoting pure athletics in the colleges of the South. Every southern State is represented among the students, while only about half of the total attendance is from the State of Tennessee. Chancellor J. H. Kirkland, who has done much to promote the growth and influence of the institution, was elected to that position in 1893.

VANDERLYN (văn'dēr-lĭn), **John,** painter, born in Kingston, N. Y., Oct. 15, 1776; died there Sept. 24, 1852. He first worked as an apprentice in a wagon shop, where he showed evidence of skill in drawing, and was afterward assisted by Aaron Burr in taking instruction in painting in New York City. In 1796 he went to Paris to study art, where he remained until 1801. He returned to America in the latter year and soon became noted for his excellent productions, but two years later returned to Paris, remaining there until 1818. The works of Vanderlyn are true to life and show much skill in tint and colors. His most famous paintings include "Ariadne," "Marius Amid the Ruins of Carthage," "Murder of Jane McCrea by the Indians," and "Landing of Columbus." He painted a large number of excellent portraits, including those of George Washington, Andrew Jackson, James Monroe, John C. Calhoun, James Madison, Joseph C. Yates, and George Clinton.

VAN DER STUCKEN (stōō'kẹn), **Frank,** composer and musical conductor, born at Fredericksburg, Texas, Oct. 15, 1858. His parents took him to Antwerp in 1864, where he studied music under Pierre Benoit (1834-1901), and later pursued a musical course at the University of Leipzig. In 1878 he began a tour of two years through Europe and for a year, from 1881 until 1882, was kapellmeister at the city theater of Breslau. Subsequently he returned to America and was chosen leader of the Arion Society in New York. In 1885 he was made director of the Cincinnati Conservatory of Music, where he later became leader of the orchestra. His opera entitled "Vlasda" was first produced in 1883. Among his later productions are "Inauguration March," "Festival March," and "Festival Hymn."

VAN DIEMEN'S LAND. See **Tasmania.**

VAN DORN, Earl, soldier, born at Port Gibson, Miss., Sept. 17, 1820; died May 8, 1863. He graduated at West Point in 1842 and took part in the Mexican War, in which he saw active service at Contreras, Cerro Gordo, and Churubusco. At the capture of the City of Mexico he was wounded. In 1849 he took part in the war with the Seminoles and later with the Comanches. During the Civil War he fought efficiently in the Confederate service. At the beginning of the war he raised a regiment in Texas, of which he became colonel, and in 1862 was promoted to the rank of brigadier general. He was defeated at Pea Ridge in 1861 and was again defeated at Corinth in 1862. Pemberton superseded him, but he continued in active service and won an engagement at Holly Springs, during the Federal attack upon Vicksburg. He was shot at Spring Hill on account of a personal quarrel.

VAN DYKE (văn dīk'), **Sir Anthony,** eminent painter, born in Antwerp, Holland, March

22, 1599; died in London, England, Dec. 9, 1641. He was apprenticed to Henry Van Balen, a painter of Antwerp, in 1609, and afterward studied under Rubens. In 1620 he left the studio of the latter to spend five years in Italy, where he came in touch with master artists in Rome, Genoa, and Venice. Charles I. invited him to England in 1632, owing to his high reputation as a portrait painter, and soon after knighted him and made him the recipient of a fine residence and an annual pension of $1,000. Van Dyke is counted the greatest of all portrait painters, except Titian, and his diligence was sufficient to produce a large number of excellent portraits, several historical paintings, and a number of productions founded on mythology. Though fond of splendor and expensive style, he left a large fortune at the time of his death. He married Mary Ruthven, granddaughter of the Earl of Gowrie. His paintings include "Saint Augustine in Ecstasy," "Saint Rosalia Crowned by the Infant Savior," "Samson and Delilah," "Adoration of the Shepherds," and "Elevation of the Cross." Among his portraits are those of members of the royal families of the Netherlands, Germany, and England. His remains were buried in Saint Paul's Cathedral, near the tomb of John of Gaunt.

VAN DYKE, Henry Jackson, clergyman and author, born in Germantown, Pa., Nov. 10, 1852. His father, Henry Jackson Van Dyke (1822-1891), was a noted pastor and under his direction the son received a careful education. After studying at Brooklyn Polytechnic Institute and Princeton College and Theological Seminary, he took a course of higher work in the University of Berlin, Germany. In 1878 he became pastor of the United Congregational Church of Newport, R. I., and from 1882 to 1899 was pastor of a Presbyterian Church in New York City. He resigned the latter pastorate to became professor of English literature at Princeton University. Van Dyke was long corresponding editor of the *Philadelphia Presbyterian.* His writings include "The National Sin of Literary Piracy," "The Poetry of Tennyson," "The Gospel for an Age of Doubt," "Straight Sermons to Young Men," "The Christ Child in Art," "The People Responsible for the Character of Their Rulers," "The First Christmas Tree," "Story of the Psalms," "Reality of Religion," and "Toiling of Felix and Other Poems." He published a series of articles on "Gospel History in Italian Painting."

VANE (vān), **Sir Henry,** statesman, born in London, England, in 1612; executed June 14, 1662. He descended from a distinguished family and, after studying at Oxford University, made an extensive tour through France and Switzerland. His contact with Puritans caused him to became confirmed in his opposition to the Anglican Church. In 1635 he came to Boston, where he was made Governor of the Massachusetts colony the next year. He was a sympathizer of Anne Hutchinson, which caused him to lose popularity with the Puritans, and, after serving as Governor for two years, he was defeated by Winthrop. In 1637 he returned to England, where he was elected to Parliament, became joint Treasurer of the Navy, and was knighted. He was reëlected to Parliament in 1640 and became a noted leader in the proceedings of the Long Parliament.

When the war broke out between Parliament and Charles I., Vane resigned as Treasurer of the navy, but was replaced in that office by Parliament. He joined Cromwell in demanding religious liberty for all, but in other matters was his opponent. He served as a commissioner to preserve peace with Scotland in 1646, and was one of the leading statesmen at the time of the Commonwealth. After the death of Cromwell he became a leader of the Republican party. On the restoration of Charles II., in 1660, he was arrested and imprisoned in the Tower. Though the king had promised to spare his life, he was tried on a charge of high treason, found guilty, and condemned to die. Vane is described as an unwise and restless man, one who was a real thorn in the flesh of Cromwell. He wrote "The Retired Man's Meditations," "The People's Case Stated," and "A Healing Question Propounded and Solved."

VAN HISE, Charles Richard, educator and geologist, born in Fulton, Wis., May 29, 1857. He attended the public schools and the University of Wisconsin, where he graduated in 1879, and was instructor there until 1903, when he was made president of that institution. In 1883 he became associated with the United States geological survey, in which capacity he was geologist of the Lake Superior division. He was made geologist for the Wisconsin geological and natural historical survey in 1897, and subsequently published a number of important reports relating to pre-Cambrian and metamorphic geology. For some years he was editorial writer for the *Journal of Geology.* Among his chief publications are "Principles of North American Pre-Cambrian Geology," "Crystal Falls Iron-bearing District of Michigan," "Iron Ores of the Lake Superior Region," "A Treatise on Metamorphism," "Marquette Iron-bearing District of Michigan," "Penokee Iron-bearing Series of Michigan and Wisconsin," and "Menominee Iron-bearing Districts of Michigan."

VANILLA (vȧ-nĭl'lȧ), a genus of climbing orchids, which are native to the tropics. They supply the perfume and flavoring extract known as *vanilla.* The plants spring from the ground and climb with twining stems on trees, usually to the height of fifteen to thirty feet, and in their upward growth produce fibrous roots that draw a portion of the plant food from the tree. Most species have a four-sided and juicy stem and fleshy leaves. These plants produce an abundance of dĕlĭcĭously fragrant, large flowers. The fruit, known as the vanilla bean, is a pod six to

nine inches long, opening at the side, and in it are a number of oily seeds. Several species of the plant are cultivated in Mexico, whence a large portion of the vanilla sold in the market of Canada and the United States is secured.

Vanilla is cultivated in various parts of South America, the West Indies, and tropical Asia as a commercial product. The beans are gathered before fully ripe. They are treated under a complicated process of fermentation to develop the rich aroma and are afterward dried under protection from the sun. Vanilla beans exported for use in foreign countries are sealed in receptacles to prevent the odor from being dissipated. The process of extracting the aromatic flavor is quite complicated and the genuine extract is somewhat expensive. It is placed in carefully sealed bottles, in which form it is sold in the market. Adulterations are made by mixing the extract of the tonka bean, a product of a tree native to Guiana, with the vanilla extract. The product made in this way is similar in odor, though not so pleasant and far less enduring.

Vanilla is used to flavor confectionery, in culinary arts, in the preparation of liquors, and in medicine as a stimulant. Leaves of the vanilla plant are gathered in Florida and shipped to Europe, where they are employed to impart a fine scent to cigars and tobacco. The usual method of scenting is to lay the leaves among the newly made cigars, or in cutting portions of them with smoking tobacco.

VAN RENSSELAER (văn rĕn'sẹ-lēr), **Stephen,** the eighth patroon, an American statesman, born in New York City, Nov. 1, 1765; died at Albany, N. Y., Jan. 26, 1839. He descended from the distinguished Dutch family bearing his name. The first of the family connected with American history was Killian Van Rensselaer (1595-1644), who acquired a vast estate near Albany, N. Y., now including three entire counties. Stephen Rensselaer was educated at Harvard University and married a daughter of Gen. Philip Schuyler in 1783. After improving his estate, he engaged in politics as a Federalist and from 1791 to 1795 was a member of the New York senate. He was a lieutenant governor from 1795 until 1801 and served as a member of the New York assembly a second time from 1808 to 1810. In 1812 he was appointed to command the United States army as major general, but, his recruits being inexperienced, met with defeat at Queenstown Heights (q. v.).

He was a canal commissioner from 1816 to 1839 and as such was instrumental in making the construction of the Erie and Champlain canals a reality. In 1819 he was made regent of the University of New York and afterward became its chancellor. To obtain accurate information of the State, he employed surveyors to make a geological survey, paying the expenses from his private funds. From 1823 to 1829 he represented New York in the United States Congress and in 1824 founded the Rensselaer Polytechnic Institute, an institution for teaching theoretical and practical science, at Troy, N. Y. Yale University granted him a degree in 1825. He published "An Agricultural and Geological Survey of the District Adjoining the Erie Canal."

VAN WERT (văn wĕrt'), a city of Ohio, county seat of Van Wert County, 76 miles southwest of Toledo, on the Pennsylvania and the Cincinnati Northern railways. It is surrounded by a fertile farming country. The chief buildings include the county courthouse, the high school, the Brumback Library, and a number of fine churches. Among the manufactures are machinery, musical instruments, clothing, lumber products, and utensils. It has electric lighting and a system of waterworks. Population, 1900, 6,422; in 1920, 8,100.

VAPOR (vā'pẽr). See **Evaporation.**

VARICOSE VEIN (văr'ĭ-kōs), the name applied to a vein that is permanently dilated. The cause of such a diseased condition is due to some obstruction to the return of blood through the affected vein. In some instances the obstruction may arise through constant pressure, as in the case of a varicose condition of the veins of the lower limbs, which usually results from long continued maintenance of the upright posture. The disease sometimes obstructs the heart itself, or results from pressures of tumors. In some instances the disease is very annoying and painful, being frequently attended by a feeling of fullness and numbness. The treatment usually involves rest and bandages applied to the affected parts.

VARIETY (vȧ-rī'ĕ-tў), the name applied to a group of plants or animals that approach very near to each other in important characteristics. The term signifies a relationship less distinct than that implied by the word species. Some naturalists do not admit of the use of the word variety, except inside the circle of domesticated species, though they sometimes apply it where the stages of growth and sexual characteristics are similar. More recently the word *variation* has come into use. It has reference to the phenomena of structural or functional deviations from the type or form of the parent. This characteristic varies greatly in different species. For instance, the turkey shows no variation in Europe from the species in America. This is true of the guinea fowl, which has not departed from the African type since being naturalized in America. On the other hand, there is a marked variation in the dog when transported and reared through successive generations under the influences of widely different environments. Cultivated plants and domestic animals are peculiar for this property, giving rise to a great variety of forms that differ widely from the original stock.

VARNA (vȧr'nȧ), a city of Bulgaria, on the Bay of Varna, an inlet from the Black Sea. It is near the mouth of the Pravadia River, has an

open harbor, and is connected by a railway with the Danube. The chief buildings include a gymnasium, the townhall, and a number of mosques and churches. It has a large trade in cereals, live stock, textiles, and dairy products. Population, 1916, 35,645.

VARNISH (vär'nĭsh), a resinous solution of certain gums or resins, used by painters and cabinetmakers to produce a shining, transparent, hard coat on a surface. Varnishes are prepared by dissolving resinous substances, such as lac, copal, mastic, or anime, in fixed or volatile oils. The product secured is termed oil varnish or spirit varnish, the latter being prepared largely by a mixture of alcohol and oils. An excellent varnish is made of amber, but it dries slowly and is expensive. Copal is used more largely than any other gum in preparing oil varnishes and is next in durability to amber. Canada balsam is employed in preparing crystal varnish for maps or drawings, being dissolved for that purpose in the purest oil of turpentine. Anime varnish, the product of an organic substance obtained by distillation from bone oil, is employed to some extent. While it dries quickly, it is liable to crack, owing to its lack of toughness. Common resin, dissolved under heat in turpentine or linseed oil, forms the varnish in general use. Its brilliancy is due to the addition of other substances. The ingredients of varnishes necessarily depend upon the purposes for which they are to be used, but the general constituents include asphalt, sealing wax, turpentine, shellac, rosin, copal, amber, mastic, linseed oil, oil of turpentine, benzoin, powdered glass, and dammar.

VARRO (văr'rō), **Marcus Terentius,** eminent poet and historian, born in Rome, Italy, in 116; died in the year 28 B. C. He belonged to a Sabine family, which had its seat in the town of Reate, and studied under Praeconinus and the philosopher Antiochus. In his political and military career he sided with Pompey, under whom he served in Spain as legate. The superior forces of Julius Caesar compelled him to surrender, but largely because his legions joined the enemy. Subsequently he proceeded to Epirus before the Battle of Pharsalia, and, when Pompey was finally defeated, he surrendered to Caesar. The latter pardoned him and made him collector of the public library at Rome. The second triumvirate, formed by Lepidus, Antony, and Octavian, included his name among the list of proscribed, but Varro saved himself by concealment and was afterward protected by Octavian. The remainder of his life was spent in study at Rome, where he was given permission to occupy his villas and use his library, which had been confiscated. The writings of Varro were numerous, but only one is extant. It is a philosophical dialogue entitled "Rerum Rusticarum, Libri III." His other writings were devoted chiefly to philosophy, history, poetry, and language. Writers credit him with being the author of 74 works in about 500 books.

VARUS (vā'rŭs), **Publius Quintilus,** Roman general, celebrated for his part in the campaigns against the Germans. He became consul of Syria in 13 B. C. and afterward was made its governor. In 7 A. D. he was sent by Augustus as governor to the territory between the Elbe and the Rhine, after that section had been conquered by Drūsus and Tiberius. An insurrection was organized in the year 9 A. D., under the leadership of Arminius, and the Romans were totally defeated in the forests of Teutoburg. Varus ended his life by committing suicide. This defeat turned the tide of Roman conquest and the Romans were never able to reconquer the region.

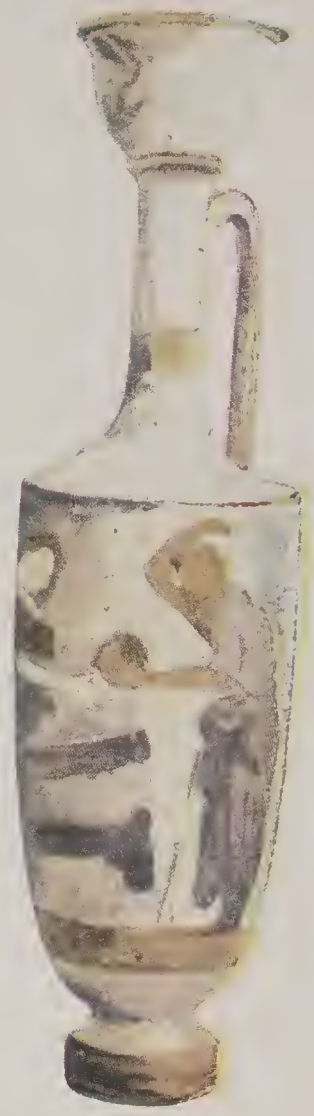
VASE, a vessel of an ornamental character, usually made of pottery, but sometimes of glass, stone, or metal. Vases were used extensively among the people of ancient times and throughout the ages have had very artistic forms. Many ornamental designs have come down to us from the Greeks, Etruscans and Romans. Throughout the Middle Ages vases of beautiful form and artistic design were produced in Europe, and many of these products are seen in the museums and other art collections. China and Japan take high rank in the production of these vessels in modern times, many of which are made of porcelain, usually colored and finely glazed. Artistic vessels of a high class are now made in many countries of Europe and America, the designs and workmanship comparing favorably with the better styles of Grecian vases, though the attention paid to work of this kind is not materially extensive. See **Pottery.**

VASELINE (văs'ē-lĭn), a substance obtained in the purification of crude petroleum, consisting essentially of a mixture of parafines. It is yellowish, translucent, and nearly odorless and tasteless. The chief uses of this product are in the arts, especially as a base in making pomade, ointment, and cold cream. It has considerable value as a lubricant and as a coating to protect steel surfaces and instruments from rust.

VASSAR (văs'sẽr), **Matthew,** philanthropist, founder of Vassar College, born in Norfolk, England, April 29, 1792; died in Poughkeepsie, N. Y., June 23, 1868. He accompanied his father, James Vassar, a French Protestant, to America in 1796, and soon after settled on a farm near Poughkeepsie, N. Y. His father established a brewery in Poughkeepsie in 1801. Matthew Vassar succeeded to the ownership of the brewery after the death of his father and derived large profits from brewing ale. He decided to devote a portion of his fortune to the founding of a school for the higher education of women and in 1861 donated $400,000 for that purpose, the institution becoming known as Vassar College. This institution offered superior advantages in practical education and scholarship, thus making it a very popular and prosperous center of learning. At his death the bequests made by his will increased this gift to











(Opp. 3022)

HISTORICAL VASES.

Turkish or Rhodian Vase of the 16th Century.

Egyptian Vase of the 5th Century A. D.

Meissen Vase Mounted in Ormolu.

Sèvres Vase of 1756.

Chinese Plum-blossom Jar of the K'ang-hsi Period.

about $800,000. In the beneficent enterprise of founding an educational institution with advanced courses, he may be considered a pioneer, and his splendid example has had many imitators.

VASSAR COLLEGE, an educational institution at Poughkeepsie, N. Y., located near the Hudson River, 73 miles from New York City. It was founded by Matthew Vassar in 1861 and was the first well equipped institution for the higher education of women. In 1865 it was formally opened with 353 students. The preparatory department was abolished in 1888. Special schools of music and painting were maintained for a few years, but since 1892 the college has offered only a four years' course for the A. B. degree and a year of graduate work for the A. M. degree. The institution has 23 departments, a faculty of 95 members, and about 1,000 students. The original endowment of $400,000 has been increased to $2,500,000. In accordance with the wish of the founder, Vassar College is distinctly Christian in its aims and influence, but it is non-sectarian. A number of fellowships and scholarships are awarded annually. The buildings include the Thompson Memorial Library, one of the finest of academic libraries, containing about 60,000 volumes. Other buildings include the chapel, with a seating capacity of 1,500, the recitation hall, three laboratories, the museum for the scientific and art collections, an observatory, a gymnasium, an infirmary, six halls for residence, and seven houses for the president and professors. The farm and garden with the collage campus include about 900 acres. James Monroe Taylor, who has been an influential factor in building up the institution, was elected president in 1886.

VATICAN (văt'ĭ-kạn), the palace of the pontiffs at Rome, now the official residence of the Pope. It is situated on the Vatican Hill, whence its name, on the west bank of the Tiber, and immediately north of the Cathedral of Saint Peter's. Besides the papal palace, the buildings include the great library and museums, the court and garden of Belvidere, a series of chapels, and a number of immense reception halls. Pope Eugenius III. built the present palace in 1145-1153 and his successors enlarged it and added vast embellishments. It includes twenty courts of great beauty and has about 11,000 rooms of different kinds. The treasures stored within the buildings are of immense value, both historically and from a financial view. Many of the apartments are of unrivaled beauty and elegance. The Sistine Chapel, built by Sixtus IV., is noted for its fine music. The Pauline Chapel and the Capella Nicolina contain some of the grandest frescoes extant. These and the vast art galleries possess some of the finest works left by Raphael, Michael Angelo, and Perugino, besides master productions of other famous artists. Some of the most valuable collections in the world are stored in the museums, especially rare specimens of ancient statuary and stones bearing inscriptions relating to noted saints, scholars and sovereigns.

The statues of note include "Faun Playing on a Flute," "Mercury," "Diana, a Fighting Amazon," and "Bacchus Riding on a Tiger." Other noted sculptures in the Vatican are the originals of the groups known as "Laocoön and His Sons," "Ariadne," and the "Apollo Belvidere." The famous Vatican Library, founded in 1378, has about 250,000 printed volumes, including 2,500 editions dating from the 15th century, and besides these are about 26,000 rare manuscripts. This library is in a building erected by Sixtus V. in 1588. More importance is attached to the contents of the buildings than to their architectural effect, though the entire group of structures with their fine gardens and monuments constitute a vast aggregation of wealth and artistic beauty, which is the chief attraction for tourists visiting Rome. The Vatican has been used by the popes as a place of residence since their return from Avignon in the latter part of the 14th century, and new popes are elected by the conclaves that meet here. It has been the only papal residence since 1860, when Rome became the capital of United Italy.

VATICAN, Council of, the ecumenical council convoked by Pope Pius IX. to meet in the Vatican on Dec. 8, 1869, and prorogued on Oct. 20, 1870. At the opening sitting 719 prelates were present and the attendance increased to 764 in the following year, the entire membership being constituted of dignitaries belonging to the Roman Catholic Church. Two so-called constitutions were adopted, one treating of the primary truths of the church, faith, revelation, and the connection between faith and reason, and the other of the primacy of the Roman see, in which the papal claim to authority over Christians was defined. The former was unanimously adopted in a session of 667 prelates and was confirmed by the Pope on April 20, 1870. Among the points of interest in this constitution is the one in which the claim is made that a jurisdiction over the whole church was directly conferred on Saint Peter, and that this primacy or jurisdiction rests in the line of Roman pontiffs, who are regarded successors to Saint Peter. The second constitution, which defines the personal infallibility of the Pope when speaking officially on doctrines of faith or morals, led to a long discussion and received the votes of 535 prelates, while two voted against it, and the remaining members were absent from the session held on July 18, 1870. The decree was promptly confirmed by the Pope. Though the council is technically still in existence, there have been no sessions since its prorogation, which had the effect of a virtual dissolution.

VAUDEVILLE (vōd'vĭl), the name applied to a kind of dramatic entertainment, so called from *Les Vaux de Vire,* the name of two valleys in Normandy. Oliver Basselin wrote a

number of satirical songs relating to current events which he named vaudeville, and this term has continued to be applied to light plays that are interspersed with dancing and comic acting. In the general vaudeville is a series of acting and singing. However, the different numbers are not closely related in style or subject.

VAUDOIS. See **Waldenses.**

VAUGHAN (vạn), **Herbert,** prelate and writer, born in Gloucester, England, April 15, 1832; died in 1903. After studying at Stonyhurst College, he pursued advanced work in Rome and in 1854 was ordained priest. He returned to England soon after and founded Saint Joseph's Foreign Missionary College, in Mill Hill, Middlesex. In 1871 he came to the United States to aid in promoting Catholic missionary work among the Negroes, and, on returning to England the following year, was made bishop of Salford. He became Archbishop of Westminster in 1892, and was soon after raised to the dignity of a cardinal. Vaughan is noted for his earnest work in favor of temperance and commercial education and as an efficient pulpit orator. As head of the Roman Catholic Church in England he wielded a wide influence. He had a proprietary interest in the *Dublin Review,* hence many of his writings were published in that periodical.

VAULT (vạlt), an extended arch, or an arched roof, so constructed that the stones, brick, or other materials composing it sustain each other and support a weight, as in a bridge or building. The art of vaulting was practiced by the Egyptians, who constructed the semicircular arch, a form of vault extending from one end of an apartment to the other, which is still employed for various purposes. Vaults of this kind were common among the Romans, but in later years they added groined vaulting, that is, structures formed by two vaults intersecting at right angles. Groined vaulting was utilized extensively in bridging streams during the Middle Ages and more recently in various forms of temple architecture. The names now applied to different kinds of vaults include semicircular or cylindrical, groined, Gothic, and diagonal. A *surmounted vault* is one having a height greater than half its span and a *surbased,* less than half its span. Modern architecture presents many fine specimens of vaulting, but steel and iron are fast superseding both arches and vaults, especially in bridges, roofs, floors, and other parts of buildings.

VAUXHALL (vạks'hạl), the name of a public garden in London, which was famous as a public resort for two centuries after the restoration in 1660. It occupied a place in Lambeth, near the manor or landed estate called Fulke's Hall, whence its name. The visitors at Vauxhall spent their time in various pastimes, largely of a loose character, thus causing the place to be mentioned by a number of novelists and dramatists. Thackeray's "Vanity Fair" makes frequent allusions to it.

VEDAS (vā'dȧz), meaning inspired knowledge, the name of the sacred scriptures of the Brahmans, comprising the earliest system of philosophy which we possess. Though the date of the origin of these writings is unknown, it is fixed by most scholars within the period between 1600 and 1400 B. C. These writings are divided into four works or books, according to the time in which they were written, and include the *Rig-Veda, Yajur-Veda, Sāma-Veda,* and *Atharva-Veda.* All are held to be divinely inspired. The *Rig-Veda* is the oldest of the Vedas and the *Atharva-Veda* is the latest. *Trayi* is a title used to describe the first three, the term meaning three-fold. Since the Vedas vary greatly in time and authorship, they represent a general evolution of thought and worship from the simpler forms to the more thoughtful and reflective, but the newer contain a greater complexity of rites. Each Veda is divided into three parts: the Sanhita, the Brahmana, and the Jnana or Upanishads. The *Sanhita* is a collection of hymns and prayers called *ganas,* or *mantras,* the *Brahmana* relates to rituals, and the *Jnana* comprises the philosophical portion. Monotheism, the doctrine that there is but one God, is the basic teaching of the Vedas, but a form of polytheism, the belief that there are more gods than one, is indicated, though only apparently, since the sun, moon, stars, fire, and the firmanent are spoken of as the manifestations and attributes of the Deity.

VEDDAS (vĕd'dȧz), or **Veddahs,** a native race of Ceylon, occupying the eastern part of the island. They are a remnant of a primitive type of mankind and are small in stature, rarely more than five feet two inches in height. The men are skilled archers and spend much of the time in hunting and fishing. Their dwellings are primitive and the government is patriarchal. This race differs from the Singhalese, who constitute the predominating people of Ceylon. Intercourse between the two is very limited. The Veddas number about 2,225.

VEDDER (vĕd'dẽr), **Elihu,** painter, born in New York City, Feb. 26, 1836. After studying painting in New York, he studied successively at Paris and in Italy. Subsequently he settled in New York, where he applied for admission to the Union army in the Civil War, but was rejected because of a defect in the left arm. He returned to Europe in 1865 and in the same year was elected a member of the National Academy. His skill as a genre painter is of high repute. Among his best works are "Death of Abel," "Monk upon the Gloomy Path," "A Dancing Girl of Venice," "Lair of the Sea Serpent," and "Arab Listening to the Sphinx." Several of his works are in the Congressional Library at Washington, D. C.

VEDDER, Henry Clay, church historian, born at De Ruyter, N. Y., Feb. 26, 1853. After graduating at Rochester University, in 1873, he attended the Rochester Theological Seminary,

and in 1876 became associate editor of *The Examiner*. In 1892 he was chosen chief editor of that publication, and in 1894 was made church historian of the Crozer Theological Seminary at Chester, Pa. From 1885 until 1892 he was editor of the *Baptist Quarterly Review,* during which time that publication was greatly improved and its circulation was increased very materially. Among his books are "Decline of Infant Baptism," "Dawn of Christianity," "Baptists and Liberty of Conscience," "Decline of Apostolic Succession in the Church of England," "A History of the Baptists," and "A History of the Baptists in the Middle States."

VEGA CARPIO (vā'gȧ kär'pē-ō), **Lope Felix de,** eminent poet, born in Madrid, Spain, Nov. 25, 1562; died there Aug. 26, 1635. His family name was Carpio, but the name Vega was taken from the estate of his father. He studied under the Jesuits in the imperial college of Madrid, where he acquired skill in grammar and rhetoric and gave evidence of having remarkable talent in writing and composition work. His first poem, "Arcadia," was written for a Spanish nobleman, to whom he became secretary after completing his studies. He joined the famous Spanish Armada for the conquest of England, but returned safely to Madrid in 1590, where he became a monk of the Order of Saint Francis and took priest's orders. No one ever stood higher in Spanish literature than he did about 1614, when he was in the height of his power as a writer of poetry and dramas. Pope Urban VIII. conferred the cross of the Order of Saint John of Jerusalem upon him, in 1637, and he was otherwise honored by princes and sovereigns. His versification is easy and graceful and his style is pleasing. He is the author of about 1,750 comedies and dramas, though only one-fourth of them are extant. His most famous poem is the "Hermosura de Angelica," a production somewhat similar to Ariosto's "Orlando Furioso."

VEGETABLE (vĕj'ē-tȧ-b'l), a name used interchangeably with the word plant, but applied in a more restricted sense to any plant that is used as an article of food. The familiar vegetables include plants that are grown as food products for their various parts, such as the leaves, roots, flower buds, and fruit. Carrots and turnips are valuable for their roots, while onions are grown for their bulbs and cauliflower for its flower buds. Cabbage and lettuce are cultivated for their leaves; potatoes, for their tubers; and beets, both for their roots and leaves. Beans and peas are grown for their seeds, which are eaten green or mature, while corn as a vegetable is eaten in an unripe condition.

Vegetables are important as food products for their starch, protein, and sugar, and the indigestible portions consist mainly of ash and fiber. The principal element is water, which is found in varying proportions, being about 58 per cent. in green beans and 95 per cent. in the cucumber. The watermelon contains less than one per cent. of protein, while others have a much larger quantity, being about 9 per cent. in the green bean.

Most vegetables have a small per cent. of fat, though it rarely exceeds one per cent., and the quantity of ash is correspondingly small. Nitrogen constitutes four per cent. of the onion, nineteen per cent. of green corn, and twenty-six per cent. of the sweet potato. A mixed diet of vegetable and animal foods is usually recommended. Ordinarily the animal foods are consumed in larger quantities in cold countries, while the vegetable foods are used more extensively in the warmer zones.

VEGETARIANISM (vĕj-ē-tā'rĭ-ạn-ĭz'm), the practice of living solely on vegetables, such as grain, fruit, pulse, and nuts. The term is used to describe both those subsisting with or without the addition of milk, butter, cheese, and eggs, but fish, fowl, and flesh are strictly excluded from the diet. The theory of vegetarianism is based upon the claim that man subsisted wholly on fruit in the period immediately following the creation, and that a vegetable diet tends to promote temperance and purity in thought and life. As a doctrine and practice it dates from the time of Pythagoras, who subsisted wholly on a vegetable diet. At present it is most strictly observed in India, where certain castes of the Hindus have practiced vegetarianism for ages. Vegetarians are opposed in their doctrine and practice by the physiologists, who generally admit that a theoretically perfect diet can be obtained from the vegetable kingdom, but hold that the stomach, teeth, and other organs are constructed in such a manner that a mixed died is preferable. Besides, they assume that it is impossible to ascertain the diet of the first man and point to the circumstance that hunting was a favorite occupation at a very early stage, thus leading to the conclusion that the diet consisted to a considerable extent or exclusively of flesh.

VEII (vē'yī), a rival city of ancient Rome, in Etruria. It is not definitely known where this city was situated, but most writers assume that it occupied the site of Isola Farnese, twelve miles from Rome. In the time of Romulus, the founder of Rome, a struggle for supremacy began between the two cities. The contest continued under all the Roman kings, except Numa, and the result was generally favorable to Rome, which was rapidly gaining in population and commercial importance. A siege of ten years at last resulted in the fall of Veii in 396 B. C. When the Gauls conquered Rome, an attempt was made to rebuild Veii and make it the capital, but it never attained material importance, though both Caesar and Augustus planted colonies on its site. Numerous remains of the Etrurians from Veii are preserved at Rome.

VEIN (vān), a membranous tube or canal

conveying blood to the heart, after it has been conducted from the heart through the arteries to the different parts of the body. The veins carry the dark or venous blood. As they do not receive the direct impulse of the heart, they differ from the arteries in their walls being much thinner and less elastic. They are usually nearer the surface than the arteries, some of them coursing along under the skin, as in the back of the hand, where they may be seen. At their farthest extremity, where they are minute in size, they are formed by the venous capillaries, which receive the blood from the arterial capillaries, and they increase in size and diminish in number as they gradually pour into one another, forming the vena cava ascending and the vena cava descending, which discharge the blood into the right auricle. The *vena cava ascending* is a large vein through which the blood from the lower part of the body is returned to the heart, and the *vena cava descending* is a vein carrying the blood from the head and upper limbs to that organ. The veins form the so-called venous system. Each lobe of the lungs has a pulmonary vein by which the oxygenated blood is returned to the left side of the heart, after being received by them through the pulmonary artery. Among the diseases of the veins are phlebitis, an inflammation of their lining membrane, and varix, a dilatation of the vein structure, which is referred to or closely connected with varicose veins. The latter are veins in a state of permanent or abnormal distention.

VEIN, in geology, a narrow formation of igneous rock that occurs in vertical or inclined fissures, differing from the stratification in which it is found. The cause of veins may be assigned to heavy pressure upon molten rock, which is thus forced through openings in the crust of the earth. Veins that bear metal are usually termed *lodes,* which sometimes extend many hundreds of feet into the earth. Boulders frequently contain small veins. In a more general sense, the word vein is applied to a mineral formation that has a horizontal position, as a vein of lignite or bituminous coal.

VELÁSQUEZ (vå-läs′kåth), **Diego Rodriguez de Silva,** eminent painter, born in Seville, Spain, in June, 1599; died in Madrid, Aug. 7, 1660. The date of his birth is not certain, but it is known that he was baptized on June 6, 1599. He descended from a noble family and was given the advantage of a good education. After studying art under Francisco Herrera the Elder, he became a pupil of Francisco Pacheco, and subsequently married Juana, the daughter of the latter. Philip IV. of Spain called him to Madrid in 1622 and appointed him imperial painter, and he remained the favorite painter of Spain until his death. He visited Italy in 1629 to study the works of Raphael, Titian, and Michael Angelo, but two years later returned to Spain. The king created him a noble in 1658 and assigned him rooms in his palace, which he is said to have visited at numerous times to witness the work of the great artist while busily engaged. Velásquez ranks next to Murillo as the most eminent Spanish painter. His noteworthy paintings include "Adoration of the Magi," "Saint John in the Desert," "Brothers of Joseph," "Christ on the Cross," "Moses Taken from the Nile," and "Gardens of the Medici," a beautiful landscape painted at Rome. He executed famous portraits of Pope Innocent X. and of Philip IV.

VELOCIPEDE (vẽ-lŏs′ĭ-pēd), the general name of any light vehicle that is propelled by the person or persons who ride upon it. The first vehicle of this kind was invented in 1817 at Mannheim, Germany, and was constructed chiefly of wood. It consisted of a wooden bar about five feet long and six inches wide, each end supported by a single wheel, and the rider sat astride on the bar and propelled the vehicle by the action of his feet upon the ground. While it did not come into general use, this machine was the forerunner of both the bicycle and the tricycle.

VELOCITY (vẽ-lŏs′ĭ-tў), a term used in mechanics to express the rate at which a body moves in space. It is said to be *constant,* or *uniform,* when the moving body passes over equal spaces in equal times, and it is termed *variable velocity* when the spaces passed over in equal times are unequal. *Average velocity* is the ratio of the whole distance passed over to the time required for such passage. Velocity is said to be *retarded* when a body passes through less space in each successive portion of time, and it is termed *accelerated* when the space passed over becomes greater during each preceding equal portion. Bodies whose movements through equal spaces are unequal at different periods are said to have a variable velocity. The velocity of a body is usually expressed at a given number of feet per second, or at so many miles per hour.

VELVET (vĕl′vĕt), a familiar pile fabric, which is made by passing the warp over wires so as to form a row of loops that project from the backing, and, when the wire is withdrawn, form an uncut or piled velvet. To make *cut pile,* the name of a kind of velvet used most extensively, a knife is passed along the groove on the top of each wire to cut the pile before the wire is withdrawn. The loops thus cut form a covering resembling a very fine but short fur. Velvet of the best kind is made entirely of silk, but inferior grades are obtained by weaving silk so as to form a face on a cotton or partly woolen basis. *Velveteen* is a fabric made of a mixture of silk and cotton. A similar product made of silk and wool is known as *plush.* It is thought that velvet was first manufactured in China, where fine grades are still produced, and it is not known when the first products were made in Western Europe. Rich

and artistic textiles were made in Italy as early as the 12th century, whence the manufacture of velvets gradually extended northward. The chief seats of modern manufacturers of velvet textiles are at present in Crefeld, Germany, and in Lyons, France.

VENABLE (vĕn'ā-b'l), **Charles Scott,** educator and author, born in Prince Edward County, Virginia, April 19, 1827; died in 1903. After graduating from the University of Virginia, he studied at the German universities of Berlin and Bonn. In 1848 he was elected professor of mathematics at Hampden-Sydney College, where he remained about seven years, and in 1856 was teacher of physics and chemistry in the University of Georgia. He was made professor of mathematics and astronomy in the University of South Carolina in 1858, but resigned in 1861 to become lieutenant colonel on the staff of General Lee. In 1865 he was appointed professor of mathematics at the University of Virginia, which institution conferred a degree on him in 1868. His writings consist largely of school text-books in mathematics.

VENDETTA (vĕn-dĕt'tà), the name applied to the practice of individuals taking private revenge upon their enemies, especially upon those who have murdered a relative. This practice originated in Corsica and the name is from the Latin word *vindicta,* meaning revenge. When a murder has been committed, the relatives of the murdered man as well as the officers pursue the guilty party, and he is slain without process of law as soon as he is apprehended. The practice exists at present to a limited extent among peoples who are not highly civilized, but it has been very largely suppressed in Italy and Corsica.

VENEERING (vĕ-nēr'ĭng), the art of attaching thin layers of fine-grained wood to a less costly or ornamental material. The veneers are cut chiefly of such woods as mahogany, maple, and rosewood, and are commonly glued to the surface of fir or pine, thus giving the finished product the appearance of the more valuable material. Recent improvements in machinery have made it possible to prepare sheets as thin as paper, thus facilitating the economical use of the finer grades of woods. In fastening the veneers, the surface is roughened so as to take glue readily, and pressure is applied while drying. The surface is afterward polished and finished, as in dealing with other solid cabinet woods. Veneering is employed principally in making the more costly furniture and musical instruments. Thin sheets of ivory and other substances are used in some kinds of veneering.

VENEZUELA (vĕn-ĕ-zwē'là), a republic in the northern part of South America, the third largest political division of that continent, being exceeded in size only by Argentina and Brazil. It is bounded on the north by the Caribbean Sea, east by the Atlantic and British Guiana, south by Brazil and Colombia, and west by Colombia. The length from northeast to southwest is 920 miles and the extent north and south is about 725 miles. It has an area of 593,943 square miles.

Description. Two chains of the Andes extend into the northern part from Colombia, the eastern branch of which is known as the Merida Mountains. These highlands attain elevations that range from 10,000 to 15,400 feet, while the western branch has summits from 2,500 to 4,000 feet above the sea. The southern section is traversed by two mountain chains, the Parima and the Pacaraima, the latter forming a large portion of the boundary between Venezuela on the north and Brazil and Guiana on the southeast. The vast interior comprises the larger part of the Orinoco basin, which is formed by a series of plains or llanos of great fertility and luxuriant vegetable growth. Here are fine forests of palms, mahogany, black and white ebony, satinwood, rosewood, cinchona or Peruvian bark, and trees that yield sarsaparilla and other drugs. Wild animal life is represented in large numbers in many sections of the country and includes the jaguar, tapir, alligator, puma, monkeys, aquatic fowls, and birds of song and plumage.

The drainage is chiefly by the Orinoco into the Atlantic. This stream forms the great outlet for Venezuela and the central part of Colombia. It receives the inflow from numerous tributaries, which include the Apure, Meta, Caura, Caroni, and Casiquiare. The last mentioned connects the Orinoco with the Negro River, a tributary of the Amazon. The Orinoco is navigable throughout the country and many of its tributaries furnish transportation facilities for large vessels. Three inlets of considerable size indent the northern shore, including the gulfs of Paria, Triste, and Venezuela. Lake Maracaibo, in the northwestern part, is the largest inland water.

Venezuela is located wholly in the Northern Hemisphere, but the climate is tropical and the seasons are distinguished as the wet and dry. The lowlands of the northeast and central parts are within the warm belt, but the heat is tempered by the trade winds from the Atlantic. Here the mean temperature varies from 75° to 90° and the low and marshy lands are sometimes subject to epidemics of yellow fever. The section of country that has an altitude above 2,250 feet is temperate and the climate is salubrious and delightful. In the highlands that lie above 6,500 feet above the sea the climate is colder and the line of perpetual snow begins at an altitude of 14,000 feet. All the higher altitudes have a healthful climate. Rainfall is ample in all parts of the country and in the lowlands it is frequently excessive, causing a large part of the country to be flooded.

Mining. The country possesses much mineral wealth, but mining has not been developed to any great extent. Salt is obtained in the Araya

peninsula, copper in the Aroa district, and iron, silver, copper, and granite are abundant in the mountains. Petroleum abounds in the states of Los Andes and Tachira. Largo la Brea, or the Lake of Pitch, is a remarkable basin and is about six miles long. It is situated near the Gulf of Paria, west of the island of Trinidad, and is famous for its extensive deposits of asphalt which is obtained in large quantities for street paving. Other minerals include coal, sulphur, tin, kaolin, and precious stones.

AGRICULTURE. Farming is the chief industry, but not more than one-third of the area is productive. Coffee ranks as the leading product and is closely followed in the yield by cacao, sugar cane, and fruits. Tobacco thrives in the lowlands, where cotton and indigo yield good returns, but these products are not cultivated extensively. Other products include vanilia, tonka beans, and many varieties of fruits. Great herds of cattle and horses are reared on the llanos. The country has large interests in raising mules and sheep. Goats, swine, and poultry are grown to some extent. It may be said in general that the methods of farming are primitive and that the breeds of live stock are not of a high grade.

MANUFACTURES. The manufacturing enterprises have not assumed extensive proportions and the output is intended more largely for home consumption than for exportation. The fisheries yield good returns for canning and curing. Some advancement has been made in the manufacture of cheese and in canning fruits. Most of the establishments are in the larger cities, where cotton weaving, tanning, wool spinning, and the manufacture of boots and shoes are carried on successfully. Among the general manufactures are furniture, sugar, pipe tobacco and cigars, clothing, spirituous liquors, earthenware, and machinery. Much of the capital employed in both manufacturing and mining is furnished by foreigners.

COMMERCE AND TRANSPORTATION. The exports greatly exceed the imports. They consist chiefly of coffee, cacao, cattle, hides and skins, balata gum, copaiba, and gold. The imports include chemicals, cotton and woolen goods, ironware, hardware, and machinery. Foreign trade is principally with the United States, France, Great Britain, Germany, and the Netherlands. Much of the trade is in the hands of German, French, Italian, and Spanish inhabitants.

At present the country has only 850 miles of railroads, but transportation is facilitated by its seaboard on the Atlantic and the Orinoco and other rivers. Communication is facilitated by 5,500 miles of telegraph lines and 425 post offices. A French cable supplies the need of communication with Europe. Interior transportation is largely by packed mules and wagons. A number of canals have been constructed as a means of utilizing some of the rivers and Lake Maracaibo for navigation.

GOVERNMENT. Venezuela is a constitutional republic and the constitution was amended with the approval of the people in 1914. Executive power is exercised by a president, who is elected for a term of seven years. General legislative power is vested in the congress of two houses, the senate and the chamber of deputies. There are 40 members in the senate, two from each state. The deputies are elected by the states according to population. Both senators and deputies serve for terms of three years. The territories are under direct administration of the federal government. A national judiciary has jurisdiction to all cases relating to the nation and the territories. Each of the states has its own executive, legislative, and judicial officers. Local government is vested in subdistricts of the state and in the municipalities. The bolivar, valued at $0.193, is the monetary standard.

EDUCATION. Attendance at school has been free and compulsory since 1870, but fully 75 per cent. of the adult population cannot read and write. Elementary schools are maintained in all the populated districts. Caracas is the seat of the national university, and five other institutions of higher learning are maintained in different parts of the country. It has four normal schools, twelve federal colleges, and a number of private and parochial schools. A national museum and library are maintained at Caracas, which has a collection of 40,000 volumes. Music, military science, fine arts, technics, and industry are taught in a number of institutions. Roman Catholicism is the state religion, but general toleration in matters of faith prevails, though most of the Protestants are foreigners.

INHABITANTS. A large majority of the people are an admixture of native whites and Negroes. The inhabitants of pure white blood are not numerous. Spanish is the official and spoken language. Caracas, on the Caribbean Sea, is the capital. Other cities include Maracaibo, Valencia, Barcelona, and Barquisimeto. In 1919 the population was reported at 2,691,636. This included 52,500 of foreign birth and 325,000 Indians.

HISTORY. Columbus discovered the coast of Venezuela in 1498. The region was visited the following year by Vespucci, who named it Venezuela, meaning Little Venice. Spaniards settled at Cumana in 1520 and it remained subject to Spain until 1811, when it declared its independence. Subsequently it again came under Spanish dominion, but in 1813 it united with Ecuador and New Granada to form the republic of Colombia. In 1830 the states again separated, but Spain did not recognize the independence of Venezuela until some years later. The country has undergone a number of revolutions and civil wars, the troubles of 1854 leading to the emancipation of the slaves. Great Britain attempted to absorb a part of its eastern territory in 1895 by annexing it to British Guiana, but that country consented to submit the question to inter-

national arbitration on a demand made by President Cleveland.

A period of internal discord began at the close of 1897, when Ignacio Andrade was elected president. Threatened by a strong revolutionary party, the president fled and a provisional government was established, but hostilities continued until the early part of 1901, when Cipriano Castro was chosen chief executive. Another crisis was reached in 1902, when Great Britain and Germany blockaded some of the ports as a means of securing an adjustment of certain claims resulting from a violation of contracts with British and German citizens. The dispute was finally submitted for adjustment to the court of arbitration at The Hague. International disputes continued to agitate the country throughout the administration of Castro, including serious complications with the Netherlands in 1908. The president sailed to Europe in the later part of the year to undergo an operation in France, but in the meantime the people rose against him and he was deposed. Although he attempted to return early in 1909, he was not permitted to land in Venezuela. V. Marquez Bustillos was elected president in 1914.

VENICE (vĕn'ĭs), a seaport city of northern Italy, on the northeastern shore of the Adriatic Sea, twenty miles east of Padua. It is situated on a number of islands in the Lagoon of Venice, a shallow sheet of water separated from the Gulf of Venice by a long sand bank, and is connected with the mainland by a railway viaduct about two miles long. The city is one of remarkable beauty, being built on 120 islands, and the different portions are connected by more than 400 bridges. The islands are only a few feet above the water and the buildings are mostly on piles constructed of stone. A great canal, the Canalazzo, divides the city into two parts. It is crossed by a number of magnificent bridges, of which the Rialto is the most beautiful, being provided with three apartments for passage and lined with decorated shops and counters. The streets of Venice are formed by the different canals, on which boats, called *gondolas,* carry the people, instead of carriages and street cars as in most cities.

Venice has an appearance of marvelous beauty at night, when the streets are beautifully lighted by gas and electricity, and the gondolas move about the canals in all directions. The piazza on the west side of Saint Mark Church is the most noted center of activity. In its vicinity may be seen large numbers of people pursuing business and amusements. Among the most noteworthy buildings is the Church of Saint Mark, built in 813, a fine structure in the Byzantine style with Gothic additions. Four bronze horses, most lifelike in appearance, stand over the door of the church. They were brought from Constantinople in 1205 and carried to Paris by Napoleon in 1797, but they were returned to Venice in 1815. Other beautiful buildings include the mint, numerous churches and schools, hospitals, asylums, and business houses and residences. It has manufactures of jewelry, velvets, silks, earthenware, sugar, laces, sailing vessels, clothing, dyes, glass, and machinery. The harbor is shallow but spacious. The city has a large export trade in rice, glass, colonial goods, and various manufactures.

Venice was founded in the 5th century by refugees, who sought safety on the islands at the mouth of the Brenta from hordes of invaders under Attila. For several centuries little progress was made, owing largely to the fact that the surrounding country had been devastated by successive incursions of the barbarians from the north, but material growth and development of its industries began in the 7th century. In 697 Pauluccio Anafesto became the first Doge or Duke of Venice. Bridges were soon constructed to unite the islands, thus giving the different groups of buildings the appearance of a united city, and a profitable trade was stimulated by the Crusades in the period from 1096 to 1271. This was due principally to the circumstance that the northern part of the Adriatic is nearest to the region from which the Christians came who participated in the Crusades. Besides, the inhabitants of the surrounding country were friendly to the enterprise undertaken by the Crusaders. Thus a number of sandy and barren islands became the seat of a remarkable commercial life and the center of great wealth and enterprise.

Having developed rapidly in population and commercial enterprises, Venice secured control of the surrounding territory of the mainland. Constantinople was conquered by the Venetians in 1204, and large accessions of territory were obtained at the final division of the Byzantine Empire. In the 15th century the population of Venice numbered about 200,000 and its commerce was the largest in Europe. Though assailed by the Turks in the 17th and 18th centuries, it was able to resist the Moslem fleets, but it suffered a considerable decline. In 1797 Napoleon took possession of the city and made it a part of Austria. The Treaty of Pressburg annexed Venice and the territory of Venetia to Italy in 1806, but it was transferred to Austria in 1814, of which it remained a part until 1866. In the latter year it was annexed to the kingdom of Italy. Population, 1910, 163,684.

VENICE, Gulf of, an extensive inlet of the Adriatic Sea, forming the southeastern boundary of Venetia, a province of northern Italy. The extent is about sixty miles, from the delta of the Po to the mouth of the Tagliamento, and east of it is the shallow Lagoon of Venice and numerous islands. The northern extension is known as the Gulf of Trieste. The rivers flowing into it include the Brenta, Adige, and Piave.

VENTRILOQUISM (vĕn-trĭl'ô-kwĭz'm), the art of speaking or producing tones in such a manner that the hearers are led to believe that

the sounds come from a different source than from the person uttering them. It depends wholly upon practice and dexterity. The secret of the art is in taking a deep inspiration, allowing the breath to escape slowly when speaking, and controlling the exhalation with the muscles of the palate and the larynx. This can be done without materially moving the lips, and the operator completes the illusion by engaging the attention of the hearers by various sleight-of-hand performances. The art is of great antiquity, being mentioned by both Jewish and Greek writers. Zera Simon and Professor Wyman are two Americans who attained a wide reputation on account of their skill in ventriloquism.

VENUS (vē′nŭs), the most brilliant of all the planets. It is classed as one of the inferior planetary bodies, having its orbit between those of the earth and Mercury. The ancients called it *Lucifer,* or the *Morning Star,* when visible before sunrise, and *Hesperus,* or the *Evening Star,* when it shone in the evening after sunset. Its general appearance is the same as that of Mercury. The mean distance from the sun is about 67,212,000 miles. A complete revolution around the sun is made in 224.7 mean solar days; hence, the year is equal to about seven and one-half of our months. The diameter of Venus is estimated at 7,700 miles. While the density is about the same as that of the earth, the volume of the planet is about four-fifths as great. Venus being very much inclined from a perpendicular, the torrid and temperate zones overlap each other, the polar regions having at one solstice a frigid temperature and at the other a torrid. A complete revolution around the axis is made in about 23 hours and 21 minutes, the axis being inclined to the ecliptic at an angle of about 75°. Venus exhibits phases like the moon in the various positions relative to the earth and the sun, but it is not known to have a satellite. It is thought to have a dense, cloudy atmosphere, and not to be sensibly flattened at the poles. Both Venus and Mercury transit the face of the sun, but the former at longer intervals. However, its transits are much more important, owing to its position in the heavens being nearer to us. Herschel expressed the view that we never see the real body of the planet, but only its vapor-laden atmosphere. See **Transit.**

VENUS, in Roman legend, the goddess of beauty and love, identified with the Aphrodite of the Greeks, who is regarded the daughter of Zeus and Dione. It was supposed that she had sprung from the foam of the sea and that she first visited the island of Cythera, whence she proceeded to Cyprus. These two islands were her principal seats. Though sought by many of the gods, she chose to marry Vulcan, but her fidelity to her husband was questioned more or less, and her intrigues with Adonis were celebrated by Shakespeare and other classic poets, The dove, sparrow, and swan were her favorite birds, and she held sacred the rose, apple, and myrtle. Her children included Aeneas, the Trojan hero, and Cupid, the god of love. In statuary she is represented with her son, Cupid, in a chariot drawn by doves, or by swans or sparrows. Annual festivals, called *Veneralia,* were held in her honor. Among the most famous statues of Venus are the "Venus of Milo," the "Venus of Onidus," and the "Venus of Capua."

VENUS'S FLOWER BASKET, the name of a vitreous sponge, so called from its beautiful form and appearance. Several species of these sponges are found in the warm seas of Asia, especially in the vicinity of the Philippines and the East Indies. The skeleton of these animals resembles spun glass in appearance and the patterns found are often remarkable.

VENUS'S FLYTRAP, a plant native to North America, found along the sandy shores of North Carolina and elsewhere. It belongs to the family of sundews and is so named from its



VENUS'S FLYTRAP.

peculiar leaves, the upper portion of which are provided with hairlike feelers that are extremely sensitive to the touch. When small insects come in contact with this traplike formation, it closes down upon them quickly and absorbs the soft parts as a food. The leaves appear to lose a part of their power to act in this way, though they sometimes serve to catch two or three insects.

VERA CRUZ (vā′rȧ krōōs), a seaport city

of Mexico, on the Gulf of Mexico, 198 miles east of the capital, with which it is connected by railway. The streets are regularly platted and paved with stone. It has secure fortifications and on the island of San Juan de Ulua, a short distance from the shore, is a well-protected castle. Most of the buildings are low and variously painted, but there are several substantial structures, including the cathedral, numerous other churches, and the customhouse. The harbor is of little importance, the only landing place being an open roadstead between the city and the castle. Among the manufactures are tobacco products, clothing, cotton and woolen textiles, utensils, and machinery. It has electric and gas lighting, telephones, several parks, waterworks, and a tramway. Having a low site, the city is quite unhealthful. The imports consist principally of hardware, spirituous liquors, textiles, and machinery. Among the exports are sugar, leather, vanilla, cochineal, cereals, and live stock. Vera Cruz was founded by Cortez in 1520, but its growth dates from the 17th century. A French army captured the castle in 1838. It was likewise taken by General Scott in 1847. From 1862 to 1867 it was in possession of the allied army of France and Spain. Population, 1920, 29,164.

VERAGUA (vȧ-rä′gwȧ), **Don Christobal, Duke of,** statesman, born in Madrid, Spain, in March, 1837. He descended from Christopher Columbus, being the thirteenth in descent from that noted explorer. After studying at the University of Madrid, he took a course in law, and in 1871 was elected to the Spanish Cortes. He was made a member of the municipal council of Madrid in 1874 and in the same year was reëlected to the Cortes. In 1878 he became a senator and served as minister of the interior and commissioner of agriculture. Three years later he was one of the presidents of the American congress at Madrid. The duke and duchess visited the United States in 1893, and on May 1 of that year attended the opening of the World's Columbian Exposition in Chicago.

VERB, a word which expresses action, being, or state of being, and which serves to denote the principal part of what is stated about the subject. With respect to their use, verbs are either copulative or active. A *copulative verb* asserts the predicate of a proposition, or of the subject, as in the sentence, "Iron is hard." *Active* verbs are divided into transitive and intransitive verbs. A *transitive* verb requires an object to complete its meaning, as "The scholar learned his lesson;" and an *intransitive* verb does not require such an object, as "The grass grows rapidly." Verbs are termed *active* or *passive,* depending upon whether the subject acts or is acted upon, and a third class is known as *neuter* verbs, which imply being or condition. Verbs, with respect to their form, are either *regular* or *irregular.* The properties of verbs are *voice, mode, tense, number,* and *person.* Verbs which are used in the conjugation of other verbs are called *auxiliary* verbs. See **Participle.**

VERBENA (vẽr-bē′nȧ), a large genus of flowering plants of the vervain family. They have four-sided stems, opposite or alternate leaves, and flowers in racemes or terminal spikes. Seventy species have been described, most of which are native to America, and many are prized in cultivation. The *nettle-leafed verbena* is three to six feet high. It has long spikes with small white flowers. Other species are the *blue, garden, bracted,* and *Rocky Mountain* verbenas. They take the form of herbs in temperate climates and grow as shrubs or trees in hot countries. All the species are easily hybridized. Several of these plants yield medicinal properties. The *lemon grass,* a species of verbena, yields the oil of verbena.



GARDEN VERBENA.

VERDI (vĕr′dē), **Giuseppe,** operatic composer, born in the duchy of Parma, Italy, Oct. 9, 1814; died Jan. 27, 1901. He was the son of an inn-keeper of limited means and was unable to take advanced musical instruction until assisted by a rich friend, who supplied the means necessary to enable him to study in Busseto and Milan. He was organist at Roncole, his native town, when he was only ten years old. In 1842 he became famous by publishing a drama entitled "Oberto di San Bonifazio," and soon after produced many beautiful operas. His most noted productions include "Otello," "Montezuma," "Requiem," "Aida," "Il Trovatore," and "Falstaff." The last mentioned is his final production, which was published in 1893.

VERDUN, a fortified city of France, on the Meuse River, 43 miles west of Metz. The features include the cathedral, the public library, and a chain of strong forts. It was ceded by Germany to France in 1552. The Germans captured it in 1870. In 1915 and 1916 it was the scene of severe bombardments by the Germans. Population, 1914, 23,876.

VERESHTCHAGIN (vyĕ-rĕ-shchä′gĭn), **Vasili,** eminent painter, born in the government of Novgorod, Russia, Oct. 26, 1842; died April 13, 1904. He studied in Russia and later became a pupil of Gerome at Paris. He en-

listed for military service in the Turcoman campaigns in 1867, and later served in the Russo-Turkish War of 1877. Subsequently he visited Syria, Persia, and many parts of India, turning his travels to good account in various paintings. The Russian authorities employed him to paint a number of scenes in connection with the execution of nihilists. At the time of the Spanish-American War he visited Cuba. He painted many scenes in the Russo-Japanese War and lost his life when the *Petropavlovsk* sunk at Port Arthur. Among his leading works are "The Road After Plevna," "Long Forgotten," "The Emir of Samarkand," and "The Pyramid of Skulls."

VERGA (vĕr'gȧ), **Giovanni,** novelist and dramatist, born in Catania, Sicily, in 1840; died Jan. 27, 1922. He removed to Italy, where he studied for a literary career and lived most of the time at Florence and Milan. In 1865 he published three novels, but his reputation was established in 1880 when he completed "Eva," which gives evidence of deep insight into psychological studies. His writings have often been compared with those of Zola. Among his best known works are "Medda," "La lupa," "Eros," "I Vinti," "Vita dei campi," "Il marito di Elena," and "Maestro Don Gesualdo."

VERGIL. See **Virgil, Publius Virgilius Maro.**

VERLAINE (vâr-lȧn'), **Paul,** poet, born at Metz, Germany, March 30, 1844; died Jan. 8, 1896. He belonged to a French family and studied chiefly in Paris. In 1881 he made an extensive tour through England and many countries of the continent, but resided in Paris until his death. His life was spent largely among people who are fond of entertainment and drinking, and part of his time was passed in the hospital or in prison. His writings are not numerous, though they rank among the foremost poems of France. Some of his productions deal with religious mysticism and all of them show many variations in the style of treatment.

VERMEJO (vâr-mȧ'hō), a river in South America, which rises in the Andes Mountains of Bolivia, and, after a general course of about 800 miles toward the southeast, enters the Paraguay about forty miles north of Corrientes. A large part of the middle course is through a swampy region, in which the channel is wide and shallow. The valley of the Vermejo is fertile and heavily timbered.

VERMES, or **Worms.** See **Worms.**

VERMIFORM APPENDIX (vĕr'mĭ-fôrm ăp-pĕn'dĭks), a long and slender process of the caecum in man and some other animals, so called from its resembling a worm in form. This organ is situated in the right side of the lower abdomen, is from three to six inches long, and in most cases projects upward and inward. The function probably is unimportant, since the organ can be removed without impairing the system. In structure the vermiform appendix resembles the large intestine. See **Appendicitis.**

VERMILION (vẽr-mĭl'yŭn), a brilliant and durable pigment of a scarlet color. It is obtained from a mineral ore called cinnabar, or is produced artificially by grinding a mixture of mercury and sulphur for several hours and then digesting the black product with potassium hydroxide until the desired color is obtained. The ore cinnabar is of a blood-red color, and vermilion is obtained by grinding the product into a fine powder. Important mines of cinnabar are worked in California, Brazil, Spain, Austria, China, and many other countries. The cinnabar mines of Almaden, Spain, are the most famous and have been in successful operation for thirty centuries.

VERMONT (vẽr-mŏnt'), a State of the United States, one of the New England group, popularly called the *Green Mountain State.* It is bounded on the north by Quebec, east by New Hampshire, south by Massachusetts, and west by New York. Lake Champlain forms more than half of the western boundary, and all of the eastern border is formed by the Connecticut River. Most of the islands in Lake Champlain belong to Vermont, including Grand and La Motte islands. The length from north to south is 158 miles and the width at the northern boundary is 90 miles, but it gradually narrows to 40 miles at the southern extremity. The area is 9,565 square miles, including 430 square miles of water surface.



VERMONT.

1, Montpelier; 2 Burlington; 3, Rutland; 4, Saint Albans; 5, Brattleboro. Principal railroads are shown by dotted lines.

DESCRIPTION. Much of the surface is mountainous. The State is divided into two nearly equal parts by the Green Mountains, which trend north and south, and in the northern part a second range branches off toward the northeast. Ranges of hills traverse the State in various directions, but no part of it is greatly elevated, and the general altitude ranges between 500 and 1,000 feet. Mount Mansfield, the highest peak, has an elevation of 4,390 feet. The lowest land is in the vicinity of Lake Champlain, where the altitude is about 100 feet above sea level. Fine forests are abundant, even to the summits of the highest mountains.

The drainage is largely into the Connecticut, which separates the State from New Hampshire, and into Lake Champlain, a fine body of fresh water forming a large part of the boundary between Vermont and New York. Among the chief streams within the State are the West and the White, flowing into the Connecticut; and the Missisquoi, the Lamoille, the Winooski, the Otter, and the Poultney, flowing into Lake Champlain. The southwestern part is drained into the Hudson River by several small streams and the Black River in the north drains into Lake Memphremagog, which forms part of the Canadian border. Small lakes are found in many parts of the mountainous sections.

The climate is marked by sudden and extreme changes and a large amount of snow falls in the winter. All seasons of the year are bracing and healthful. The climate is milder in the vicinity of Lake Champlain than in the more elevated parts of the State, but that body of water is frozen over a part of the winter. In summer the temperature ranges from 60° to 92° and in winter from 10° to 45°. The extremes are 30° below zero in winter and a summer heat of 98°. All parts of the State have adequate moisture, with a rainfall of 32 inches in the south and 40 inches in the north.

Mining. Granite is the chief mineral product, but the State has deposits of copper, lead, slate, and small quantities of gold and silver. Marble of a fine grade is quarried at Proctor and the quality, both in whiteness and durability, is in competition with the marble of Carrara, Italy. Large quantities are obtained for construction and monumental purposes. Copper is mined in the eastern part of the State, in the vicinity of Ely. Slate is quarried chiefly in Rutland County and Barre is celebrated as the center of large quarries that produce a fine grade of gray granite. Clays of a superior quality are abundant. Other minerals include manganese, iron, asbestos, and soapstone.

Agriculture. About 80 per cent. of the area is included in farms, which average 142 acres. The largest portion is devoted to the cultivation of hay and forage, about 1,050,000 acres. The acreage of these products greatly exceeds that of all other crops combined. The leading cereals include oats, corn, barley, buckwheat, and rye. Farming is generally conducted with great care so as to utilize the soil to the best advantage. Commercial fertilizers are employed to a considerable extent to enrich the land and modern machinery is used generally upon the farms.

Dairy farming is especially noteworthy and more than half the cattle are dairy cows. Butter and cheese of a fine quality are produced, and the product is shipped largely to markets in Boston and other commercial centers of the East. Horses of good breeds are grown for the market, but the number of heads is much less than that of cattle. Other domestic animals include sheep, swine, mules, and poultry. Both farming and the animal industry are diversified in every part of the State, and nearly all of the farms have a variety of domestic animals and a varied line of crops.

Manufacture. Butter, condensed milk, and cheese together represent the most important manufacture, when considered from the standpoint of value for the past several years. Lumber and timber products usually rank second, but in value are nearly equaled by the output of marble and stone works. Other lines of manufacture include monuments and tombstones, paper and wood pulp, flour and grist mill products, cotton and woolen textiles, hosiery and knit goods, and foundry and machine shop products. The general manufactures include cigars, hardware, furniture, sugar, and farming machinery. Many of the mountain streams furnish power for operating machinery, especially such as is usually run by electricity.

Transportation. The State has 1,125 miles of railroads. The principal lines include those of the Boston and Maine, the Grand Trunk, and the Central Vermont. Additional transportation facilities are furnished by the Connecticut River and Lake Champlain. Numerous electric lines are operated in the cities and some of the rural districts. The highways are usually in a good state of repair.

Government. The present constitution was adopted in 1793, but it has been amended several times by conventions and by the people. Executive authority is vested in the governor, lieutenant governor, secretary of State, treasurer, and auditor of accounts, each elected by the people for two years. The Legislature is constituted of the senate with 30 members and the house of representatives with 246 members. Each town and city within the State has a representative in the lower house, while representation in the senate is based upon districts according to population. The members of both branches are elected every two years. A supreme court of seven judges is at the head of the judicial system, which includes courts in each county and justices of the peace in the towns. Each probate district has a probate court. Local government is administered by the counties, municipalities, and towns.

Education. State aid is given to maintain the public schools, but local funds and taxes are the chief means that are utilized to support the educational work. Many of the schools in rural districts have been combined and pupils are transported to centrally located buildings. In 1906 the Legislature enacted several measures which are important to the general advancement in educational work. These measures include a system of district supervision, which is now in successful operation and has been the means of stimulating interest in educational work among the pupils and teachers. Under these laws much has been done to classify and

broaden the work in the high schools throughout the towns and cities of the State.

Three public normal schools are maintained, at Castleton, Johnson and Randolph, but additional normal training is given in several high schools and colleges. Foremost among the higher institutions is the University of Vermont, which is located at Burlington. The Middlebury College is located at Middlebury; the Norwich University, at Norwich; the Home for Friendless Boys, at Westminster; the Vermont Academy, at Saxton's River; the Brigham Academy, at Bakersfield; and the Goddard Seminary, at Barre. Waterbury and Brattleboro have hospitals for the insane. Windsor is the seat of the State prison, Rutland has a house of correction, and Vergennes has an industrial school. A home for disabled soldiers is maintained at Bennington.

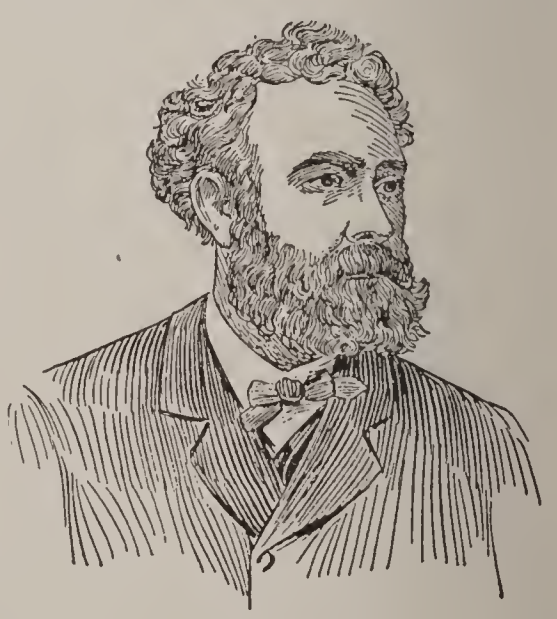
INHABITANTS. The State has the smallest per cent. of urban population among the North Atlantic states. However, it has no large cities, although it is important as a manufacturing State. The inhabitants consist chiefly of people who are of British descent. In 1900 they included 44,747 foreigners, of whom 25,540 were Canadians. All the leading religious denominations are represented. In numerical order they take rank as follows: Methodists, Congregationalists, Baptists, Roman Catholics, and Episcopalians. Montpelier, on the Winooski River, is the capital. Other cities include Burlington, Rutland, Saint Albans, Brattleboro, Barre, Saint Johnsbury, and Bennington. Population, 1900, 343,641; in 1920, 352,421.

HISTORY. The region included in Vermont was first visited in 1609 by Samuel Champlain, who explored the lake bearing his name. In 1761 the first settlement was made at Bennington. The district was claimed by both New York and New Hampshire and the governors of both states granted title to the same lands, thus causing a conflict of titles. New York obtained a decision of the king favorable to its claims in 1764, but the people of Vermont resisted. They organized militia and remained independent by making a military defense. Ethan Allen and Seth Warner became the leaders of a company known as the Green Mountain Boys, and with them the claims of New York were resisted until 1789, when that State recognized the independence of Vermont. It was admitted as a State on March 4, 1791, New York receiving at that time $30,000 for its claims. The admission of Vermont was the first to take place after the thirteen original states had been formed into a constitutional Union. Vermont was a battle ground in the Revolution. The battles of Crown Point, Ticonderoga, and Bennington engaged many of its citizens.

Vermont was more democratic than any other New England State in the early history, having comparatively few wealthy people. The university was founded in 1791 and schools became generally established soon after. Montpelier was located in the central part in 1808. Saint Albans was a base of operations in the Fenian operations of 1866 and 1870. Although the State adopted constitutional prohibition of the liquor traffic in 1852, this measure was repealed in 1902 and a local option law was enacted the following year. In 1908 the Legislature established district supervision for the public schools and several other measures in the interest of education.

VERMONT, University of, a coeducational institution of higher learning at Burlington, Vt. It was founded in 1791 and the Vermont Agricultural College was incorporated with it in 1865. The first class graduated from it in 1804. The departments include those of liberal arts, sciences, commerce and economics, medicine, and mechanical and electrical engineering. Entrance is based upon examination or certificates issued by accredited schools. The University library contains 97,500 volumes. It has a faculty of 107 instructors and professors and an attendance of 700 students.

VERNE (vârn), **Jules,** eminent author, born in Nantes, France, Feb. 8, 1828; died at Amiens, France, March 24, 1905. After studying in his native city, he took a course in law at Paris. He published his first writings for the stage in 1850, but his success dates from 1863, when he began to write his remarkably popular series of stories. The first of these writings is entitled "Five Weeks in a Balloon," a work remarkable for its combination of imaginative power and scientific knowledge. Others along the same or similar lines soon followed. Many of his writings have been translated into the English, German, Spanish, and other languages. His best known works include "A Trip to the Center of the Earth," "Twenty Thousand Leagues Under the Sea," "Around the World in Eighty Days," "From the Earth to the Moon," "Across Africa in a Balloon," "Adventures of Captain Hatteras," "The Mysterious Island," "A Nephew from America," and "Christopher Columbus."



JULES VERNE.

VERNET (vâr-nâ′), **Claude Joseph,** famous painter, born in Avignon, France, Aug. 14, 1714; died in Paris, Dec. 3, 1789. He was first instructed in painting by his father, Antoine Vernet, and in 1732 went to Italy, where he re-

mained twenty years. His works at Rome were largely scenes of seaports, storms, moonlights, and other sea views. He was recalled to Paris in 1753 to paint the seaports of France, and was shortly after made a member of the French Academy. The fifteen paintings made by him of seaports of France are works of remarkable beauty and may still be seen in the Louvre. Many of his works have been engraved.

VERNET, Jean Émile Horace, eminent painter, born in Paris, France, June 30, 1789; died there Jan. 17, 1863. He was a son of Antoine C. Vernet (1758-1836), also a painter, and a grandson of Claude Joseph Vernet. The Revolution made it impossible for him to secure a good general education, but his genius in painting was developed at an early age under the personal supervision of his father. He finished his famous painting, "Taking of an Entrenched Camp," when twenty years of age. His works are numerous and are noted for realistic treatment of the subject rather than the classical, thus distinguishing them from those of Jacques Louis David (1748-1825) and other French painters. Vernet enriched his mind by traveling extensively in Southern Europe and Western Asia. He spent some time in Rome under the patronage of Louis Philippe, who had commissioned him to paint a number of war scenes relating to the conquest of Algeria. He made a tour of Egypt in 1840 and in 1842 visited Saint Petersburg, whence he went with Czar Nicholas to Sebastopol. In 1853 he accompanied the French army to Varna to witness several battles. His fame rests on a large number of paintings of battles and genre pictures, many of them in connection with the wars of Napoleon. Among his best known paintings are "The Battle of Wagram," "Dog of the Regiment," "Barrier of Clichy," "Soldier of Waterloo," "Battle of the Alma," "The Capture of the Smala," and "Battle of Jena."

VERNIER (vĕr'nĭ-ēr), a contrivance for subdividing the divisions of graduated arcs or scales into minute parts, so named from Peter Vernier of Brussels, who invented it in 1631. The apparatus consists of two scales, one movable and sliding along the side of the other, which is fixed. On the movable scale are ten divisions, which are equal to either 9 or 11 divisions of the fixed scale. In the one case they are numbered from 0 to 10 forward, or in the same direction with the numbering of the fixed scale, while in the other case the reading of the vernier scale is backward, or in the opposite direction from that of the fixed scale. The scale of inches divided into tenths will exemplify the use of the vernier in obtaining readings of tenths of these subdivisions, or of hundredths of inches. In the case of the vernier scale of 10 parts, equal to nine-tenths of an inch, it is obvious that the moving of the vernier one-tenth of one of the divisions of the fixed scale will bring the division of the vernier marked 1 into coincidence with a line of the fixed scale, and similar combinations are made by the multitude of movements that are possible. Two or three verniers, usually arranged at equal divisions of the circle, are attached to many astronomical and geodetical instruments.

VERNON (vĕr'nŭn), **Edward**, noted admiral, born in Westminster, England, Nov. 12, 1684; died in Suffolk, Oct. 29, 1757. He was the son of James Vernon, who was Secretary of State from 1697 to 1700. Young Vernon entered the navy at the age of sixteen years. In 1704 he witnessed the capture of Gibraltar and took part in other battles in the Mediterranean, and in 1708 sailed to the West Indies as rear admiral. He captured the Spanish city of Porto Bello, in Panama, in 1739, with the loss of only seven men. In 1741 he became a member of Parliament and in the same year was given command of a large fleet to attack Cartagena, Colombia, but was defeated with severe loss and compelled to retire to Jamaica. When Prince Charles, the pretender, threatened London, Vernon was given command of the fleet to guard the coasts of Sussex and Kent, but soon after entered into a quarrel with his officers and his name was stricken off the list. Lawrence Washington, eldest brother of George Washington, accompanied Admiral Vernon on his expedition against Cartagena, and it is due to this circumstance that his home on the Potomac was named Mount Vernon.

VERONA (vĕ-rō'nȧ), a city of northern Italy, in the province of Venetia, 68 miles west of Venice. It occupies a fine site on the Adige River, near the Tyrolese Alps. The surrounding country is noted for its rich landscape scenery and general fertility, producing cereals, silk, and fruits. A line of substantial walls surrounds the city. These walls were begun by Emperor Gallienus, in 265 A. D., and were completed by Charlemagne. It has modern fortification outside the old walls, the whole works of defense making the place one of the most strongly defended in Southern Europe. Verona is the center of a large trade and has extensive interests in manufacturing enterprises. It is the converging center of a number of important railroad lines. Among the manufactures are cotton and silk textiles, woolen goods, hosiery, hats, pottery, jewelry, earthenware, and machinery. Fruit and stock culture are important industries in the surrounding country. Large quantities of wine and preserved fruits are produced in the vicinity. It has an important trade in cereals, sausages, cattle, and dairy products.

Verona has many beautiful buildings, among them the Scaligeri Palace, dating from 1370, a fine cathedral consecrated by Urban III. in 1187, and palaces built by the Pompei and Canossa families. It has the arena dating from the reign of Diocletian. The history of the city dates from the time of the Romans, under

whom it became a prosperous commercial center. Constantine captured it in 312, Theodoric in 489, and Charlemagne in 774. Its subsequent history is that of northern Italy, passing to the kingdom of Italy in 1866. Within recent years a number of substantial improvements have been made, such as the construction of electric lighting and rapid transit, the building of macadam and asphalt pavements, and the extensions of the gardens, parks, and public thoroughfares. Population, 1916, 86,128.

VERONESE (vā-rō-nā′zā), **Paul,** the popular name of Paolo Cagliari, a famous painter, born in Verona, Italy, in 1528; died in Venice, April 20, 1588. He was the son of Gabriele Cagliari, a sculptor, who taught the son the arts of his own profession. His natural taste for painting caused him to be placed under his uncle, Antonio Badile, under whom he rapidly developed skill as a biblical and historical painter. He painted successively in several Italian cities, including Rome and Venice, but made the latter his chief residence. Among his most noted paintings are his "Martyrdom of Saint Sebastian" and "The Baptism of Christ," both in the Church of Saint Sebastian at Venice. These and others of his paintings show great excellence in coloring and fertility of imagination.

Veronese was a contemporary of Titian and Tintoretto, with whom he ranks in the number and beauty of his productions, and he may be regarded one of the greatest painters of the Venetian school. His famous works include "Marriage at Cana," "Rape of Europa," "Venice, Queen of the Sea," "Banquet in the House of Simon the Pharisee," "Calling of Saint Andrew to the Apostleship," "Consecration of Saint Nicholas and Saint Helena," "Family of Darius at the Feet of Alexander," and "Vision of the Invention of the Cross." He painted a number of portraits and heads, this collection including about 120. Among them are those of Queen Eleanor of France, Charles V., Sultan Solyman I., Queen Mary of England, Titian, Tintoretto, and Vittoria Colonna.

VERONICA (vĕ-rŏn′ĭ-kȧ), **Saint,** a female saint connected by tradition with the passage of Christ to Calvary. It is thought that she was a native of Jerusalem. At the time Christ was bearing the cross to Golgotha she met our Savior, on whose brow she observed the sweat occasioned by the weight of the cross, and gave him her veil to remove the perspiration. As Christ removed the sweat from his brow, his divine features were miraculously marked upon the veil, with which Veronica is said to have converted Emperor Tiberius of Rome to the view that Christ is divine. The veil is still preserved by the canons of Saint Peter's in Rome.

VERRAZANO (vĕr-rȧt-sä′nō), **Giovanni,** navigator and explorer, born in Florence, Italy, about 1480; died at Calmenar, Spain, in 1527. He became a navigator at an early age and in 1522 captured a cargo valued at $1,500,000, which Cortez had sent from Mexico to Charles V. of Spain. In 1524 he landed at Cape Fear, North Carolina, and thence sailed northward to Portsmouth, N. H. He returned to Europe in 1526, where he secured aid from France in making a second voyage to America, but was captured by the Spanish and taken to Spain, where he was executed by the order of the emperor. Several letters were published in 1524 in which an account was given of the voyages of Verrazano and his explorations of the Atlantic coast of North America from 34° to 50°.

VERRES (vĕr′rēz), Roman governor of Sicily, born in 112; died in 43 B. C. He was appointed quaestor in Cisalpine Gaul in 82 B. C., two years later served in the army of Asia, and shortly after was made governor of Sicily. His government in the rich island province is famous for the greed and cruelty with which he enriched himself and impoverished the people. The Sicilians at last tired of his tyranny and brought him to Rome for trial in 70 B. C., where he was defended by Hortensius and accused by Cicero. The orations of Cicero against Verres were so powerful and convincing that the latter fled to Marseilles (Massilia), where he lived in exile for 27 years. Though having an abundance of means to enjoy life, his riches at length caused Antony to crave his possessions and finally to put him to death by proscription.

VERRILL (vĕr′rĭl), **Addison Emery,** zoölogist, born at Greenwood, Me., Feb. 9, 1839. He graduated at the Lawrence Scientific School, Harvard University, in 1862, and was made professor of zoölogy at Yale in 1864. From 1867 to 1870 he was professor in the University of Wisconsin. He gave special attention to marine zoölogy, investigated the invertebrate fauna of the Atlantic coast, and published much of value regarding mollusks, polyps, and the squids of the North Atlantic. Subsequently he investigated the geology of the marine animals of the Bermuda Islands and made a fine collection of specimens, which were placed in the Peabody museum of Yale University. Among his chief publications are "Revision of the Polypi of the Eastern Coast of the United States," "Report upon the Invertebrate Animals of Vineyard Sound," and "Cephalopods of the Northeastern Coast of America."

VERSAILLES (vĕr-sālz′), a city in France, capital of the department of Seine-et-Oise, ten miles southwest of Paris, with which it is connected by railway. Tourists regard it one of the handsomest cities of Europe, having long and straight streets, beautiful gardens and parks, and many fine adornments. It is noted rather for its pleasure than industry. The fine improvements and beautiful situation have caused it to be made the residence of many foreigners. The city has few manufactures and little more than local trade. It may be said that Versailles

dates from the time of Louis XIII., who maintained a country villa here, which he made his residence while hunting and rusticating. Louis XIV. spent large sums of money in building the Palace of Versailles and in embellishing the city. Later he made it the permanent seat of his court. Interior alterations and decorations were made by Louis XV., who spent large sums of money to beautify the palace, and the city continued to be a court residence down to the Revolution of 1789. The palace was converted by Louis Philippe into a museum, in which form it still exists. The palace is 1,400 feet long and is decorated within and without by beautiful forms of architecture. In the museum are collections of paintings and statues from the time of Clovis to the present. Among the most imposing paintings are those of Horace Vernet, illustrating the career of Napoleon.

Versailles was made the headquarters of the German army in October, 1870, and in its palace King William I. was proclaimed emperor of Germany in 1871. It was the seat of the French government from 1871 to 1879 and the headquarters of the army during the Commune. The Treaty of Versailles, signed in 1783, recognized the independence of the United States. In visiting France it is very desirable to witness the beauty of Versailles. Among the prominent features are some of the largest and finest fountains in the world, grand statuary, beautiful monuments, and costly paintings. In the vicinity are extensive orchards, orange groves, and gardens of flowers. The water supply is carried by a canal 200 feet ide and a mile long. This canal is lined on both sides by avenues of beautiful trees. The construction of electric lights and street railways has added much to the beauty and convenience of the city. Population, 1916, 64,820.

VERSE, a line of poetry, consisting of a certain number of accented and unaccented syllables. The ancients established thirty short syllables as the maximum length of the verse and counted a long syllable equal to two short ones. However, in lyric poetry the verse often exceeded this length. In modern poetry each verse is marked theoretically by one chief stress and a slight pause is regularly assigned at the end. Lines that do not end in rhymes constitute blank verse. In poular use the word verse is often used instead of stanza. Poetry in a collective sense is frequently referred to as verse.

VERTEBRATA (vĕr-tĕ-brā′tȧ), the highest branch of the animal kingdom, so named from having numerous joints in the spine, or backbone. Animals that belong to this division have jaws that move vertically and not laterally. The skeleton has many bones with ends suitable for jointed limbs. The brain is inclosed within a skull, which gives form and protection to the organs of hearing, sight, smell, and taste. With the brain is connected a nerve tube, known as the spinal cord, which passes through the spine, and from it run series of nerves to the skin, muscles, and other organs of the body. The lungs, heart, and stomach as well as other important organs are in the upper part of the thorax, which is formed by the sternum, the ribs, the diaphragm, and the portion of the spinal column to which the ribs are attached.

Vertebrates have a complicated digestive system, which is divided into the oesophagus, small intestine, liver and pancreas, and large intestine. Various glands secrete fluids that are essential in the process of digestion. Respiration is facilitated by lungs in animals that breathe air and through gills in the water-breathing types. Circulation of the blood is carried on by means of the heart, arteries, veins, and capillaries, and the blood is red through the presence of red blood corpuscles. The body is protected by the skin and double protection is furnished in many cases by hair, scales, and feathers. In vertebrates the sexes are usually separate.

VERTIGO (vĕr′tĭ-gō), or **Dizziness,** a symptom of some forms of cerebral disturbances, usually attended with obscurity of vision and disordered movements. The effect is that the intelligence is not able to correct the erroneous suggestions of the senses. Vertigo may arise from the presence of too much or too little blood in the brain, or from the effect of poisons upon the circulation. Sometimes it results from objects passing swiftly across the field of vision, as water falling rapidly from a great height, or by ascending to unaccustomed heights. Persons who are subject to epilepsy and paralysis have frequent attacks of vertigo. It usually acts as a symptom of the approach of an attack in these diseases.

VERTUMNUS (vĕr-tŭm′nŭs), a divinity of ancient Rome, worshipped as the deity who presided over changes and transformations, especially the blooming and bearing of trees and other plants. It was possible for him to assume any shape he pleased. He fell in love with Pomona, the goddess of the fruit of trees, who became his wife. Gardeners offered garlands and buds to him on the 23d of August.

VERVIERS (vâr-vyȧ′), a city of Belgium, in the province of Liége, fifteen miles southeast of Liége. It is finely located on the Vesdre River and has good railroad facilities. The noteworthy buildings include the Church of Saint Remacle, the public library, the city hall, and the central railroad station. Verviers is noted for its extensive manufacture of cloth, the annual product of which has a value of $15,500,000. Other manufactures include confectionery, machinery, soap, leather, chemicals, ironware, dyes, and clothing. It is a modern city, having well-platted streets, substantial pavements, gas and electric lighting, and an extensive system of rapid transit. Formerly it was strongly defended by stone works, but its

fortifications were destroyed by Louis XIV. of France. Population, 1916, 48,735.

VESPASIAN (vĕs-pā′zhĭ-ạn), **Titus Flavius,** Emperor of Rome, born in the Sabine town of Reate, Nov. 17, in the year 9 A. D.; died there June 24, 79. He was of common birth and was the first plebeian to attain the throne of Rome. After serving with the army in Thrace, he was made quaestor in Crete and Cyrene, and rapidly rose to the offices of aedile and praetor. He served in Germany from 43 to 44 and in the reign of Claudius had command of a legion in Britain. Soon after he was sent as governor to Africa, where his reign is described as honorable and upright. In 67 he was appointed to conduct the war in Judaea, where he became highly distinguished by his military successes. While in Caesarea in 69 he was proclaimed emperor, first by an army in Egypt and later by his troops in Judaea. Vitellius claimed succession to the throne after the death of Nero and was supported by the Roman troops in Gaul and Germany, but the eastern army was unanimous in declaring for Vespasian and soon defeated Vitellius and captured Rome. Vespasian entered the capital in 70, where he was hailed by the people and recognized as emperor by the senate.

Vespasian had married the daughter of Flavia Domitilla, a Roman knight, by whom he had two sons, Titus and Domitian. Titus was placed in command of the army in Judaea and soon ended the Jewish War by capturing Jerusalem, thus restoring peace in the Roman world in the first year of Vespasian's reign. The succeeding nine years of his government are memorable for the peace that Rome enjoyed, the *peace of Vespasian* passing into history as a proverbial phrase. Once firmly established on the throne, he restored the capitol, which had been burned when Rome was taken by his army. He reorganized the army, reformed the civil service, constructed public baths and a new Forum, built the Temple of Peace, and began the Colosseum. No Roman sovereign ranks higher as a friend to the common people and a ruler mindful of justice and economy in the administration of government. He encouraged artists and men of letters, granting Quintilian and a number of others a handsome pension. It is said of him that he liked a joke, was simple in his mode of life, and was easily approached in conversation. He was succeeded as sovereign by his sons, Titus and Domitian.

VESPUCCI (vĕs-pōōt′chĕ), **Amerigo,** astronomer and navigator, born in Florence, Italy, March 9, 1451; died in Seville, Spain, Feb. 22, 1512. He was educated under the patronage of his uncle, a scholarly Dominican and a friend of Savonarola. His preference as a student was for philosophy, geography, and astronomy. After finishing his studies at school, he became a clerk in the commercial house of the Medici, then the ruling family of Florence. In 1490 he accompanied Lorenzo de' Medici to Spain on a commercial enterprise, which country he visited at numerous times, and on May 10, 1497, sailed from Cadiz on an expedition to America. The tour was designed more particularly for astronomical research than geographical discovery, but the enterprise was fruitful in both lines. After cruising on the shores of the Canary Islands, the expedition of four vessels crossed the Atlantic in 27 days and reached the Bay of Campeachy, the southern extension of the Gulf of Mexico. The expedition next doubled Cape Sable and cruised along the Atlantic coast of North America to Cape Hatteras, whence it returned to Spain in 1498. Vespucci made a second voyage to America in 1499, when he cruised along the coast of Brazil from Cape Saint Roque to Lake Maracaibo, and thence sailed to the island of San Domingo. In 1501 he sailed under Dom Emanuel of Portugal and explored the coast of South America from Cape Saint Roque to the Bay of Rio Janeiro.



AMERIGO VESPUCCI.

Vespucci sailed with an expedition for Malacca in 1503 under the Portuguese, but his ship became separated from the others and sailed to Brazil, reaching the Bay of All Saints. He sailed southward from the vicinity of Bahia and explored the coast of Cape Frio, where he built a fort. In 1504 he returned to Lisbon, Portugal, and the following year entered the Spanish service, with his seat at Seville. The remainder of his life was devoted largely to writing accounts of his various journeys and preparing maps of his routes and explorations. Only a few of his writings are extant, most of our sources of information being from quotations and allusions to his works. It is quite certain that he reached the mainland of America in 1497, eighteen days before Cabot. A book published in 1507 by a geographer named Waldseemüller at Freiburg, Germany, contains numerous allusions to the discoveries of Vespucci and other explorers. He makes the statement: "Now a fourth part [of the world] has been found by Amerigo Vespucci, and I do not see why we should be prevented from calling it Amerige or America." It is from this work that the New World became known as America.

VEST, George Graham, statesman, born at Frankfort, Ky., Dec. 6, 1830; died Aug. 9, 1904. In 1848 he graduated from Center College,

Kentucky, and afterward studied law in the Transylvania University at Lexington. He removed to Missouri in 1853 and for some years pursued a successful law practice at Sedalia. In 1860 he became a member of the Missouri Legislature and subsequently served two years as a representative in the Confederate Congress and one year in the Confederate Senate. He was elected to the United States Senate in 1879, in which he continued to be an active and influential member until 1903. From 1893 to 1895 he was chairman of the Committee on Public Buildings and Grounds. Subsequently he held other important committee positions at various times. Vest is noted as an able orator and a leading member of the Democratic party.



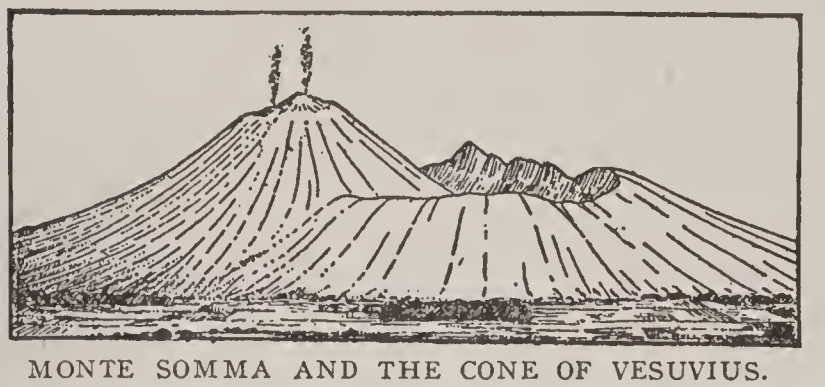
GEORGE G. VEST.

VESTA (vĕs'tȧ), a distinguished divinity of Rome, regarded the goddess of fire and of the hearth. Her temple in Rome, containing as it were the hearthstone of the nation, stood close beside the palace of Numa Pompilius. Never-ceasing fire burned on her altar, which was attended by priestesses called Vestal Virgins. It is said that Numa established the vestals, four in number, but afterward they were increased to six. They were chosen from the noblest families in Rome at the ages of six to ten years and held their office for thirty years. The first ten years were devoted to initiating them in their religious duties, which they performed the second ten, and the third period was occupied in instructing new priestesses. They were supported from the public treasury and received many special privileges, such as the best seats in the theater and the honor of being accompanied by a lictor while riding in state. If they met a criminal on his way to execution they had the power to pardon him, provided the meeting was accidental. The vestals were vowed to chastity and a violation of the vow was punished by the offender being stoned to death or buried alive. The *Vestalia,* a festival held in honor of Vesta, occurred on the 9th of June and was celebrated exclusively by women, who walked barefooted in procession to the temple of the goddess. Citizens observed the feast by eating in their own homes, the articles consisting of bread, fish, and herbs, which were eaten before the hearth and in the presence of images dedicated to the Penates, the household gods. With the adoption of Christianity by Constantine, in the 4th century, the worship of Vesta ceased.



VESTA.

VESUVIUS (vē-sū'vĭ-ŭs), a famous volcano in Italy, situated near the Bay of Naples, about ten miles east of the city of Naples. The mountain rises from the plain of Campania. It has a circumference of 30 miles at its base and rises 4,225 feet above the level of the sea. The surrounding plain is about 2,200 feet above the sea, thus making the pyramidal cone 2,025 feet above the adjacent country. In ancient times it had but one peak, but now there are two distinct summits, known as Somma and Vesuvius. Monte Somma is a precipice forming the wall of an ancient, prehistoric crater greater than that of the present volcano, and the mountain is thought to be only half as high as in former times, its upper half having been blown away by a colossal eruption of which no historical record remains. The cone lies south of Monte Somma, from which it is separated by a valley known as Atrio del Cavallo, and at the western end of the valley is an observatory, at which the eruptions and indications of disturbances are studied. The distance across the cone is 2,000 feet and it slopes inward to a depth of 500 feet, forming a cup-shaped crater. Tourists may ascend to within a short distance of the mouth of the crater by a cable railway, where they secure a fine view of the surrounding country, and may study the substances brought up by volcanic eruptions, which include forty different minerals.



MONTE SOMMA AND THE CONE OF VESUVIUS.

Though earthquakes and eruptions have taken place in the region of Vesuvius at various times since the beginning of the historic period, it has been densely populated for more than twenty centuries. The earliest recorded symptoms of activity occurred in 63 A. D., but it is reasonably certain that vast disturbances took place at a much earlier period. Pompeii and Herculaneum, two cities near the base of Vesuvius, were buried by an eruption in 79. Excavations made in modern times have established the fact that lava was not emitted during this eruption, but that the inundation took place by reason of the steam given off by the mountain becoming condensed into rain, which mixed with the light volcanic dust and flowed down the slope, thus

covering the surrounding region with a pasty mud. Numerous eruptions have occurred since then. The presence of internal fires gives evidence of constant activity. In 1036 a vast discharge of liquid lava flowed from the crater. It is estimated that the great eruption of 1631 destroyed 18,000 lives. In 1794 a vast stream of lava 1,210 feet wide destroyed the town of Torre de Greco. Other noted eruptions occurred in 1855, 1861, 1872, 1879, 1885, 1903, and 1905. The more recent earthquake in the vicinity of Messina, in 1908, was accompanied by extensive eruptions from Vesuvius. On the slopes of Vesuvius are fine gardens and orchards, producing grapes, oranges, lemons, apples, and vegetables.

VETCH. See **Tare.**

VETERINARY (vĕt'ĕr-ĭ-nā-rў), the branch of medicine that treats of the diseases and injuries of domestic animals and relates to their medical and surgical treatment. The practice of veterinary medicine and surgery is of considerable antiquity, treatises on that subject having been written by Hippocrates and other Grecians. However, the schools which teach veterinary science as an exclusive branch are of modern institution, the first on record being built at Lyons, Frances, in 1762. Shortly after similar schools were founded in various parts of Europe, or veterinary faculties were added to institutions already established. The first institution of that kind in England was founded in London, in 1791, and the first in Germany, at Berlin, in 1792. The leading veterinary schools in Germany have been raised to the position of university rank, especially those at Berlin and Hanover.

In the United States, veterinary science is taught mostly in private institutions, though some of the State institutions have departments devoted to that science. Chairs in veterinary medicine are maintained in Cornell College and Harvard and Pennsylvania universities. Special schools of veterinary medicine are located in Minneapolis, New York, and a number of other cities. Questions relating to veterinary science are referred by the government to the Department of Agriculture, being under the direct charge of the Bureau of Animal Industry. This is true likewise of Canada, where the veterinary director-general and live stock commissioner is an officer under the Department of Agriculture. The literature relating to the practice is very extensive, especially in the French, German, English, and Latin.

VETO (vē'tō), a Latin term, meaning *I forbid,* applied in civics to the power vested in one branch of the government of the state to negative the resolutions of another branch, or to the constitutional right of the chief executive to forbid or refuse to approve a legislative enactment. In Rome the tribunes of the people had power to stop any measure of the senate deemed injurious by pronouncing an *interdico,* meaning *I interdict.* The laws of Poland, passed in 1652, vested the right of intercepting legislation in each individual deputy of the imperial diet, who entered his protest by issuing a *nie pozwalam,* signifying *I do not permit it.* In the United States the power to veto legislative enactments is vested in the President and in the governors of the several states. In various other offices it extends to officials having executive powers, such as the mayor of a city. The veto power in the United States is qualified, not absolute, for the reason that after it has been exercised a rejected measure may become a law by two-thirds of the members of each branch of the legislative body voting for its passage, when it is said to be passed over the veto of the executive.

In Great Britain the sovereign may veto a bill of Parliament, but that power has not been exercised since 1707, when assent to a bill regulating the militia in Scotland was refused by Queen Anne. In Canada, when a measure has passed both houses of Parliament, it is submitted to the Governor General for his signature. This official may reserve it for the consideration of the colonial secretary, if he considers that it interferes with imperial interests. The imperial government may disallow any such measure within two years. The governments of all nations recognize the right of veto in the sovereign, or some specially constituted body, but the veto power is greatest in the more autocratic governments, as in Russia, Turkey, and China.

VEUILLOT (vē-yō'), **Louis Eugene,** author, born in Boynes, France, Oct. 13, 1813; died in Paris, April 7, 1883. After finishing a college education, he secured a position in the department of the interior, and in 1844 became associated with the *Univers Religieux,* a periodical devoted to religious discussion. In 1850 he conveyed a large subscription of funds to the archbishop of Turin and on his return visited Rome. His writings are numerous, most of them being devoted to religious topics and directed against the socialistic tendencies of modern Europe. "La vie de Jésus Christ" is one of his best known works.

VEVAY (vĕ-vā'), or **Vevey,** a town of Switzerland, in the canton of Vaud, ten miles east of southeast of Lausanne. It is finely situated on the northern shore of Lake Geneva, at the mouth of the Veveyse River, and is famous as a health resort and residence of foreigners. A railway line passing along the shore of Lake Geneva furnishes transportation facilities. Among the noted buildings is the Church of Saint Martin, which contains the tomb of Broughton. It has a number of excellent schools. A fine bridge crosses the Veveyse. The surrounding country is noted for its fine orchards, vineyards, and beautiful climate. It has manufactures of wine, condensed milk, and watches. Population, 1916, 12,980.

VIADUCT (vī'ȧ-dŭkt), a structure for carrying a road across a deep valley or a ravine, differing from a bridge in that the piers are the most prominent features in its construction. Formerly viaducts were made largely of wood or stone, but now they are constructed chiefly of iron and steel. In most cases heavy foundations are made of concrete or stone, upon which the piers of steel rest, and the stringers are likewise of steel. Several short spans usually make up a viaduct and the piers are shaped in the form of towers. The longest viaduct in the world is at Boone, Iowa, constructed in 1901 by the Chicago and Northwestern Railroad Company, as a means of crossing the Des Moines River. It has two tracks, is 185 feet high, and has a length of 2,685 feet. A similar viaduct crosses the Des Moines River at Fort Dodge, Iowa. Other noted viaducts include those at Valley City, N. D.; across the Pecos River, in Texas; and at Gokteik, Burma. See **Bridge; Valley City.**

VIA MALA (vē'ȧ mä'lȧ), a remarkable gorge in Switzerland, situated in a portion of the canton of Grisons called Hinterrheinthal (Farther Rhine Valley). The walls of the gorge are 1,350 to 1,600 feet high, forming a narrow space between, and at the bottom flows the Hinter Rhine. Formerly the gorge was called the Lost Gulf, owing to the difficulty experienced in reaching it, but a fine road was built along its sides in the early part of the last century. The roadway crosses and recrosses the narrow gorge from side to side by bridges fully 400 to 625 feet above the river. This roadway is necessarily narrow, since it was required to blast the hard rock with powerful explosives, but it is one of the grandest and most beautiful passageways in Europe. The region is visited by many tourists.

VIAUD (vē-ō'), **Louis Marie Julien,** sailor and author, born in Rochefort, France, Jan. 14, 1850. He descended from a Huguenot family and in 1867 entered the navy. In 1881 he was promoted to the rank of colonel and served with distinction in the Tonquin campaign. He was decorated with the cross of the Legion of Honor in 1878 and made a member of the French Academy in 1891. His works were generally published under his pseudonym, *Pierre Loti.* As a writer he is classed with the romanticists, as opposed to the realistic school, and his novels have a strong vein of imagination and charming style. His writings are very numerous, including "Matelot," "Aziyadé," "Au Maroc," "Madame Chrysanthème," and "Fantôme d' Orient."

VIBURNUM (vī-bûr'nŭm), a genus of shrubs and small trees of the honeysuckle family, which embraces about eighty species. The branchlets are opposite, the leaves are entire or serrate, the buds are naked, and the flowers are axillary or in terminal clusters. The fruit is a dry or fleshy drupe, having one seed. Twelve species of viburnum have been catalogued in North America, including the arrowwood, hobble bush, sweet viburnum or sweet berry, and dockmakie or maple-leafed viburnum. The last mentioned grows to a height of six feet and in appearance resembles young maples. Several species yield medicinal properties and a yellow dye is obtained from the branches. A species known as *viburnum lentago,* or the *wayfaring tree,* is native to the warmer parts of Europe and Asia. It is planted as an ornamental shrub for its small, white flowers and handsome leaves. The *laurestinus* is a species with evergreen leaves and clusters of rose-colored flowers. It is valued as a plant for house decoration.

VICAR (vĭk'ẽr), an official in some of the Christian churches, or the term applied to a person who serves as deputy to another. In the Church of England a vicar is a priest of the parish, the revenues of which belong partly to another body or corporation. Such a priest is supported by the lesser tithes or a special endowment. A vicar-general in the Roman Catholic Church is a priest who acts as the deputy of a bishop in the government of the diocese, but his duties are confined to matters that do not demand full episcopal functions. The Pope assumes the dignity of vicar of Christ on earth.

VICENZA (vē-chĕn'tsa), a city of Italy, capital of the province of Vicenca, forty miles northwest of Venice. It is situated on the Bacchiglione River and is surrounded by a farming and fruit-growing country. The city is well built, has railway facilities, and is lighted by gas and electricity. The chief buildings include the townhall and a number of famous churches, including the cathedral and the Church of Madonna del Monte. It has a public library of 54,500 volumes, an art academy, and several fine schools. The manufactures include woolen goods, leather, straw hats, musical instruments, and machinery. In the 12th century it belonged to the Lombard League, which opposed Frederick Barbarossa. In 1404 it became subject to Venice, but is now an integral part of Italy. Population, 1916, 65,678.

VICHY (vē-shē'), a town of central France, in the department of the Allier, about sixty miles northwest of Lyons. It occupies a fine site on the Allier River and is surrounded by picturesque hills covered with vineyards and orchards. Vichy is noted for its numerous mineral springs, whose waters are strongly impregnated with various saline substances. It has commodious hotels and summer villas and is famous as a summer resort, its health and pleasure seeking visitors often numbering many thousands annually. The waters are bottled and sold in the market. Fine baths are maintained at the hotels for the accommodation of visitors. Soda is the leading constituent of the water, which ranges in temperature from 40° to 115° Fahr. Persons suffering from indigestion, gout,

chronic catarrh, and other ailments find the application of the water of lasting benefit. The value of these springs was known to the Romans. Many remains of marble baths dating from Roman occupation have been found in the vicinity. Population, 1916, 15,524.

VICKSBURG (vĭks'bûrg), a city of Mississippi, county seat of Warren County, 44 miles west of Jackson. It is on the Mississippi River, a short distance below the mouth of the Yazoo, and has communication by the Yazoo and Mississippi Valley and the Queen and Crescent railroads. The principal buildings include the county courthouse, the Charity Hospital, the Cherry Street College, the Federal building, and the Saint Aloysius College. It has well-paved streets, public waterworks, sanitary sewerage, and electric street railways. The national cemetery contains 16,727 graves. The manufactures include cotton-seed oil, oil cake, machinery, lumber products, boots and shoes, carriages and wagons, saddlery, clothing, and tobacco products. Vicksburg was settled in the early part of the 19th century and was incorporated in 1840. It was strongly fortified in 1861 and attempts to capture it were made by the Federal forces under Sherman and Farragut in 1862. Since it was the only strong position on the Mississippi in the hands of the Confederates, General Grant conducted a siege against the city until July 4, 1863, when it surrendered with 31,600 men and 60,000 muskets. Population, 1900, 14,834; in 1920, 17,391.

VICKSBURG CAMPAIGN, the name of a series of operations in the Civil War of the United States, the purpose of which was to capture Vicksburg, Miss., and ultimately secure control of the Mississippi. In December, 1862, General Grant, aided by General Sherman, began the campaign with an army of 48,000 men. The former advanced against the city by land, while General Sherman descended the river, but was repulsed at Chickasaw Bluffs on the 20th. This temporary defeat caused the campaign to be abandoned until January, 1863, when General Sherman proceeded to attack the Confederates at Haines's Bluff, while McPherson and McClernand planned to cross the river from the west side under protection of the gunboats under Commodore Porter.

A preliminary victory was won by the Federals at Port Gibson in April and as a result the lines of the Confederates were contracted. Grant and Sherman won a victory at Champion Hill and the Big Black River in May, and the Confederates under Pemberton were compelled to retreat into Vicksburg. Grant undertook to capture the city by assault in May, but, failing to do so, he decided to begin a siege. He held a position on the center, while Sherman was on the right and McClernand on the left. Porter held the Federal base of supplies along the Yazoo River. A lack of supplies and disease made it necessary for Pemberton to surrender, which he did after withstanding a siege for 47 days. The surrender took place on July 4, 1863, the day following the Federal victory at Gettysburg.



MAP TO SHOW THE VICKSBURG CAMPAIGN.

VICTOR (vĭk'tĕr), a city of Colorado, in Teller County, about six miles southeast of Cripple Creek, on the Midland Terminal, the Florence and Cripple Creek, and other railroads. It is surrounded by a productive gold and silver producing region, to which it owes its prosperity. The features include the high school, the public waterworks, and picturesque mountain scenery. Among the industries are bottling works, lumber mills, smelters, and ore-sampling works. It has a large trade in merchandise. The place was platted and incorporated in 1894. Population, 1900, 4,986; in 1920, 1,777.

VICTOR, the name of three popes and two antipopes of Rome. See **Pope.**

VICTOR EMMANUEL II., King of Italy, born in Turin, March 14, 1820; died in Rome, Jan. 9, 1878. He was the eldest son of Charles Albert, King of Sardinia, and received a liberal education under the Jesuits. In 1842 he married the Archduchess Adelaide of Austria. He was a commander in the campaign of 1848-1849 and displayed much gallantry at Goito and Novara, defeating the Austrians with considerable loss. His father abdicated after the latter battle, on March 23, 1849, and Victor Emmanuel became King of Sardinia. The Austrians demanded that the Sardinian constitution granted by his father should be withdrawn, but he insisted upon maintaining it, thus making himself popular with the people of Italy, who came



PARLIAMENT HOUSE AT VICTORIA

On Belcher Avenue, between the business district and the wharves, is a group of public buildings surrounded by extensive lawns and facing a space where stands the statue of the first Governor of British Columbia. The central edifice of the group is the Parliament House. On one side stands the Provincial Museum and on the other the Government Offices. Their handsome stone façades, above which rises the great rounded dome of the Parliament Building, have a striking and harmonious effect.

(Art. Victoria)

to call him the *Honest King*. He found a wise counselor in Count Cavour, with whose assistance he reorganized the army, regulated the finances, reformed the civil service, and secularized the church property, but for the last named public act was excommunicated by the Pope. In 1853 he took part with the European powers against Russia in the Crimean War and in 1859 formed an alliance with France, thus enabling him to renew the contest against Austria.

He commanded in the battles of Magenta and Solferino and by the Peace of Villafranca added Lombardy to his dominion, but ceded Nice and Savoy to France. Tuscany, Parma, Romagna, and Modena voted to consolidate with Sardinia, and all of southern Italy was united under Victor Emmanuel when Garibaldi conquered Naples and Sicily. He assumed the title of King of Italy on March 17, 1861, and the Peace of Vienna, in 1866, growing out of an alliance with Prussia, caused Austria to cede Venetia. At the outbreak of the Franco-German War of 1870-1871 Napoleon was compelled to withdraw the French garrison from Rome, when that city became the capital of United Italy. Victor Emmanuel entered Rome on July 2, 1871, Florence having been the capital since 1865. The epoch of his entire government extended over 29 years, and his reign over United Italy covered a period of eight years. He was succeeded by his son, Humbert I.

VICTOR EMMANUEL III., King of Italy, born Nov. 11, 1869. He was educated at Rome under the direction of Colonel Osio, who was strict in his discipline and thorough in outlining instruction. In 1889 he completed his military education and was given a command in the national division of troops stationed at Naples, where he demonstrated much executive ability as an officer. He married Princess Helene of Montenegro in 1896. On July 29, 1900, he ascended the throne of Italy, succeeding his father, Humbert I., who had been assassinated. In his official proclamation, issued immediately after ascending the throne, he expressed the determination to protect the unity and independence of Italy established by Victor Emmanuel II. and ably maintained by his father, Humbert I. His official acts demonstrated his devotion to the constitution and a liberal government. He improved the discipline of the army and fostered education. At the time of the earthquake in the vicinity of Messina, in 1908, he did much to relieve the suffering caused by the catastrophe. See **Humbert I.**



VICTOR EMMANUEL III.

VICTORIA (vĭk-tō′rĭ-ȧ), a city in Texas, county seat of Victoria County, on the Guadalupe River, 95 miles southeast of San Antonio. It is on the Southern and the San Antonio and Aransas Pass railroads. The surrounding country is a fertile region. Among the principal buildings are the county courthouse, the city hall, the high school, the Nazareth Seminary, and the Saint Joseph's College. It has manufactures of cotton-seed oil, dairy products, cigars, and machinery. The municipal improvements include waterworks and sanitary sewerage. Population, 1900, 4,010; in 1920, 5,957.

VICTORIA, a seaport city of Vancouver Island, capital of British Columbia, on the northern shore of the Strait of Juan de Fuca It has communication by electric railways and by the Esquimalt and Nanaimo Railroad. Regular lines of steamers are maintained with the city of Vancouver, Seattle, and other ports on the Pacific. Esquimalt, about three miles distant, with which it is connected by an electric railway, has a fine harbor. The streets are wide and regularly platted, crossing each other at right angles. They are improved by substantial pavements, drainage and sanitary sewerage, and electric lighting. The municipality has a fine system of public waterworks.

Victoria has extensive commercial interests with the Orient and Australasia. The manufactures include flour, chemicals, earthenware, hardware, soap, leather, lumber products, ships, spirituous liquors, and machinery. Among the notable buildings are the customhouse, the post office, the government house, the city hall, the Anglican and Roman Catholic cathedrals, and the Anglican Woman's College. It has a number of excellent public schools, hospitals, orphanages, and private institutions of higher learning. The place was originally a trading post of the Hudson's Bay Company, but was platted in 1852 and incorporated as a city in 1862. Owing to the fine climate and interesting scenery, it is popular as a resort for tourists. Population, 1901, 20,919; in 1921, 38,727.

VICTORIA, a State of the Commonwealth of Australia, situated in the southeastern part of the continent. It is bounded on the north and northeast by New South Wales, east by the Pacific Ocean, south by the Pacific Ocean, Bass Strait, and Indian Ocean, and west by South Australia. Bass Strait separates it from Tasmania. The length from east to west is 448 miles and the general width is about 235 miles. It has an area of 87,884 square miles, hence is the smallest State in the Commonwealth.

DESCRIPTION. An irregular range of mountains traverses the State from west to east, forming the southern extension of the Great Dividing Range. Most of the surface consists

of unwooded plains, and the northwestern part belongs to the region of the Great Plains. The Australian Alps are in the eastern part, from which numerous chains trend in various directions, and toward the west they merge into the Grampians. Mount Bogong, height 6,512 feet, and Mount Hotham, height 6,075 feet, are the highest peaks of the Australian Alps within the State. Mount William, height 5,590 feet, is the most elevated summit of the Grampians. Ranges known as the Pyrenees and the Hume Range extend in ridges between the Australian Alps and the Grampians. Belts of timber extend along the streams and scattered groups of trees characterize the undulating plain. The varieties of forest trees are very numerous, including the eucalypti or gum trees, she oak, honeysuckle, cherry, acacia, and allied species. In most of the regions that have timber the trees are widely apart and the surface is quite free from underbrush, thus affording a good growth of grasses.

The drainage belongs to two systems, one sloping toward the south and the other forming a part of the Murray valley. Most of the streams are short and not navigable. The Murray forms the larger part of the boundary between the State and New South Wales and receives the inflow from the Owens, Goulburn, and Campuspe rivers. Among the streams flowing toward the south are the Mitchell, Tambo, Taylor, Yarra, and Wannon. Port Philip Bay, with an area of 870 square miles, is an important inlet from Bass Strait. Numerous small lakes with saline waters are found in the northwestern part and these have no outlet to the sea.

Though sudden changes occur in the condition of the atmosphere, the climate is generally healthful and agreeable. The extremes of temperature range from 32° to 110° and the annual average is about 58°. January is the warmest and July the coldest month. Ice sometimes forms in the coldest part of July, but it disappears before the sun reaches the meridian. The year may be divided into two seasons, the hot, dry season, extending from October to March, and the moist, cool season, from April to September. Rainfall is heaviest in the eastern part, where it is from 30 to 50 inches, but it decreases gradually toward the northwest, where it does not exceed 10 to 14 inches. Drouths are not infrequent in this section.

Mining. The State has extensive deposits of minerals and has yielded about two-thirds of the gold obtained in Australia. The annual output of gold averages about $15,750,000. Granite, iron, coal, copper, tin, lead, and zinc are obtained in considerable quantities. Precious stones of much value occur in the mountains, especially garnet, ruby, agate, topaz, and sapphire. Mining is conducted by modern methods, chiefly with machinery and British capital, and the exportations are extensive.

Agriculture. Farming is a more extensive enterprise in Victoria than in any other State of the Commonwealth. This is due to the fact that the rainfall in the southern and eastern parts is normally certain and that a large portion of the State has soil of much fertility. Wheat is grown on nearly half of the cultivated land and is the leading crop. Both oats and wheat are raised to some extent for hay, and, when grown for that purpose, they are cut green. However, the yield of oats is large and this cereal takes rank as the second crop of importance. Other farm products include barley, rye, vegetables, and fruits. Grapes are cultivated very extensively, yielding large quantities of the finer species. The sheep and wool industry has improved materially with almost every decade, and correspondingly large interests are vested in rearing cattle and horses of a fine grade. Other domestic animals include mules, swine, goats, and poultry.

Manufactures. The manufacturing enterprises were retarded in their development to some extent by the profitable investments in mining and farming, but they are now in a state of healthful growth. Many of the industries are connected with the mines, especially in smelting and machine shops. Other enterprises include flour and grist mills, clothing and textile factories, potteries and brickyards, vintages, breweries, metal works, creameries, and cheese factories. The fisheries furnish considerable material for curing and canning. Large quantities of fruit are canned for exportation. Among the general manufactures are saddlery, hardware, cigars, preserved meats, and utensils.

Transportation. The State has 3,750 miles of railroads in operation, and electric railways are operated in the larger cities and many of the rural districts. All of the railroads are owned and operated by the government under a commissioner. Most of the lines are in the central part of the State, but the system is connected with those of New South Wales and South Australia. The trade is largely with Great Britain, but considerable foreign trade is carried on with France, Germany, and the Netherlands. Among the exports are wheat, wool, gold, butter and cheese, live stock, hides, and preserved meats. The imports consist chiefly of clothing, machinery, and metal wares. In the volume of trade Victoria ranks next to New South Wales. Melbourne and Geelong, both on Port Phillip Bay, are the leading ports.

Government. The State has government similar to that of the other members of the Commonwealth. Its chief executive is a Governor appointed by the British crown. Legislative authority is vested in the Parliament, which consists of a legislative council and a legislative assembly. The former has 35 members elected for six years, and the latter has 68 members elected for three years. A property

qualification is required to permit voting for members of the upper house, but such is not the case when voting for members of the assembly. Local government is administered in subdivisions corresponding to the towns and counties of Canada. The government has fostered the extension of transportation facilities and encouraged the development of the material industries.

EDUCATION. Elementary and secondary schools are maintained under the direction of the State. Attendance upon school is compulsory and free between the ages of six and thirteen years. Practically all the adult population above the age of fifteen years is able to read and write. The larger part of secondary instruction is in the hands of private and denominational interests. Melbourne has a fine university, with which are connected a museum, a library, an observatory, and zoölogical and botanical gardens. Other higher institutions include several colleges, normal schools, technical institutes, schools of agriculture and horticulture, and schools of mines.

INHABITANTS. The inhabitants consist largely of Europeans and their descendants. About three-fourths of the people are Protestants. Among the leading denominations are Anglicans, Roman Catholics, Presbyterians, Wesleyans, and Episcopal Methodists. Melbourne, in the south central part, is the capital. Other cities include Ballarat, Geelong, Sandhurst, Williamstown, Footscray, and Hamilton. The population in 1921 was 1,531,529. This included 5,601 Chinese and 196 natives.

HISTORY. Captain Cook visited the coast in 1770 and George Bass made explorations in 1798, discovering Bass Strait. Lieutenant Murray took possession of Port Phillip Bay in 1802. The first permanent settlement was made by the Henty family on Portland Bay in 1834, after which whale fishing and sheep raising began to develop. The region was incorporated with New South Wales in 1835 and was formally opened for settlement the following year. Melbourne was platted in 1837 and soon developed trade with the interior. It was separated from New South Wales in 1850 and the colony of Victoria was organized the following year.

A large number of immigrants came to the colony in 1851, when gold was discovered. Within ten years the population increased to 540,322. Melbourne became a city in 1856 and soon obtained a large interior and foreign trade, while Geelong, on the opposite side of Port Phillip Bay, became an important trade center. The colony rapidly developed its agricultural, mining, and stock-raising interests, making it the most prosperous and densely populated of the Australian provinces. With the building of railroads to all sections and the navigation of the Lower Murray, settlements and trade were carried to the interior points. The people, being generally in favor of Australian federation, ratified the federal constitution by a large majority in 1898. A general strike of laborers occurred in 1907, but it was finally settled by arbitration.

VICTORIA, a genus of plants that resembles the common water lily, so named in honor of Queen Victoria. A species known as *Victoria regia* is the largest of the water lilies. The leaves of this plant are nearly round and have a diameter of five or six feet, floating on the surface of the water, and the flowers are about fourteen inches in diameter. These flowers are quite fragrant, have a rose color, and appear among the leaves upon prickly stalks. Several species are found in the northeastern part of South America, especially in the swamps and lagoons lying between the Amazon and the Orinoco. They have been brought to Europe and North America for cultivation in hothouses, where they are admired for their large size.

VICTORIA I., Alexandria, Queen of Great Britain and Ireland and Empress of India, born at Kensington Palace, May 24, 1819; died Jan. 22, 1901. She was the only child of the Duke of Kent and of Louisa Victoria, Princess of Saxe-Coburg-Saalfeld and the granddaughter of George III. Her father died in 1820, when she was but eight months old, and her education was left to her mother, who trusted her to the Duchess of Northumberland for instruction. She succeeded her uncle, William IV., on June 20, 1837, as Victoria I., and was officially crowned at Westminster in 1838. Victoria was the sixth sovereign of the house of Hanover. On Feb. 10, 1840, she married Prince Albert, of the German house of Saxe-Coburg-Gotha, who descended from King Wettin, the founder of the house of Saxe-Coburg-Gotha and contemporary of Charlemagne. This union was an unusually happy one. The royal couple had four sons and five daughters. The nine descendants include the following: Victoria, married in 1858 to Frederick William, later Emperor of German, died in 1901; Albert Edward, now Edward VII., married in 1863 to Alexandra of Denmark; Alice, married in 1862 to Prince Frederick William of Hesse, died in 1878; Alfred, married in 1874 to Marie of Russia, died in 1901; Helena, married in 1866 to Prince Christian of Denmark; Louisa, married in 1871 to the Marquis of Lorne; Arthur,



QUEEN VICTORIA I.

married in 1879 to Princess Louise Marguerite of Prussia; Leopold, married in 1882 to Princess Helena of Waldeck, died in 1884; and Princess Beatrice, married in 1885 to Prince Henry of Battenberg.

Lord Melbourne was at the head of the government when Queen Victoria ascended the throne, but he was succeeded in 1841 by Robert Peel. Other leaders of distinguished statesmanship succeeded to the government from time to time, thus making her entire administration characterized by wise leaders. Her long reign of about 64 years, the longest in England, witnessed notable changes in the history and geography of the world, and within that period Great Britain extended its territory very materially. Though colonial wars were frequent and various disturbances occurred in Ireland, England passed through a comparatively long era of peace, prosperity, and industrial development. The revolutionary period of 1848 was safely bridged over and the queen lived in the time of many important historical events, among them the Civil War in the United States, the union of the kingdom of Italy, the rise of the German Empire, and the establishment of the French Republic. Among the leading events of her reign are the abolition of the Corn Laws, the adoption of the penny postage, the Catholic Emancipation act, the enfranchisement of the Jews, the Crimean War, the Irish Land Act, the rebellion in India, and more or less important wars in Egypt, Afghanistan, and South Africa.

Her husband died in 1861 and she lived in comparative retirement until 1876, when she again personally attended the opening of Parliament and was proclaimed Empress of India. The life of Victoria stands as an example of piety and devotion, though in governmental matters she exercised little potent influence, leaving the conduct of state affairs largely to the public ministers. While her reign was of longer duration than that of any English sovereign, it was surpassed by only a few rulers, Louis XIV. of France being a notable example. The fiftieth year of her reign was celebrated by the British people as a golden jubilee in 1887, and ten years later they celebrated the diamond jubilee with imposing ceremonies. She patronized learning and art and aided in the publication of a number of works. These include "Early Days of His Royal Highness the Prince Consort," "Leaves from the Journal of Life in the Highlands," and "Life of the Prince Consort." She was succeeded by her son, who assumed the title of Edward VII.

VICTORIA CROSS, a naval and military decoration of Great Britain, which was instituted by royal warrant on Jan. 29, 1856, and bestowed for conspicuous bravery and devotion to the country in the presence of the enemy. It is open to all officers and men of the regular and reserved forces, and is a much coveted decoration. The Victoria Cross originated in connection with the Crimean War. It consists of a bronze Maltese cross, bearing the figure of the crown surmounted by a lion, and on the scroll below are the words, *For Valour.* The decoration is accompanied by a pension, and holders are entitled to add the letters V. C. to their names.

VICTORIA FALLS, an extensive cataract of South Africa, in Rhodesia, on the Zambezi River. It is located a few miles below the confluence of the Kwando and the Zambezi, about 225 miles northwest of Bulawayo, and excels the Niagara both in height and in the volume of water. The Zambezi flows over a broken and brush-covered plateau and is a mile wide some distance above the point where it plunges into a chasm 400 feet deep, but this chasm is not more than 300 feet in width at the bottom. A dense cloud of vapor rises above the falls, hence the native name *Mosi-wa-Tunya,* meaning roaring smoke. The famous Victoria bridge of the Cape-to-Cairo Railway crosses the river just above the falls. It is the highest structure of the kind in the world, being 420 feet above the water, and is 600 feet long. It is constructed of steel and affords a fine view of the falls.

VICTORIA NYANZA (nyän′zȧ), an extensive fresh-water lake of Africa, the largest of the great equatorial lakes, lying directly under the Equator and about 400 miles from the Indian Ocean. It is about 3,500 feet above sea level and has an area of 26,250 square miles. The waters are not excessively deep, but it has a number of deep bays, and near its shores are a number of fertile islands. Sesse, in the northwest, and Ukerewe, in the southeast, are the largest of these islands. Captain Speke, an African traveler, discovered the lake in 1858. It is now considered the source of the Nile, the overflow passing through the White Nile into Lake Albert Nyanza, about 100 miles northwest. The discharged water forms in its course three cataracts, known as Ripon, Karuma, and Murchison falls, the last named having a descent of 120 feet. The southern half of Victoria Nyanza belongs to German East Africa and the northern half to British East Africa. In its vicinity are extensive forests and an abundance of animal life. It has fine fisheries.

VICUÑA (vē-kōōn′yä), a species of llamas found in South America, immediate in size between the alpaca and the llama. It has a long and slender neck and is covered with a short, curled wool. The color is a rich brown, but patches of white occur on the legs and on the shoulders. These animals ascend great elevations in the Andes and are usually seen in small herds. They are wild and difficult to approach. The Indians entrap them by constructing a circle of stakes nearly a mile in circumference.

VIENNA (vĭ-ĕn′nȧ), in German *Wien,* the capital and largest city of Austria-Hungary, on the Danube River, near the foothills of the

Wiener Wald, the eastern extremity of the Alps. It is 330 miles southeast of Berlin, has a temperate climate and an annual rainfall of 24 inches, and is about 562 feet above the sea. The city is the converging center of a large number of important railroads and through it passes the Danube Canal, an extensively improved branch of the Danube River, into which the Wien, a small stream, carries its waters. It is a well-built and handsome city, having straight and spacious streets, fine squares, and numerous public parks. In the number of its large and handsome modern buildings Vienna ranks with any of the European capitals. It is officially divided into ten municipal districts. The older part is known as the inner town, and lies almost exactly in the center of the others. That portion is still the most aristocratic quarter.

In the inner town are the principal hotels, many of the embassies and legations, government offices, and the palace of the emperor. The other districts include Leopoldstadt, Landstrasse, Wieden, Margarethen, Mariahilf, Neubau, Josefstadt, Alsergrund, and Favoriten. Leopoldstadt is the chief commercial center and has many Jewish inhabitants. Alsergrund contains the military hospital, the municipal asylum, and an extensive general hospital. The principal manufacturing industries are carried on in Neubau, Mariahilf, and Margarethen, and the chief officials have their seat in Landstrasse. Ringstrasse, which encircles the inner city, is the finest street of the city and takes rank with the most beautiful thoroughfares in the world. Among the larger buildings are those of the government, including the fine imperial palace, the houses of parliament, the courts of justice, the customhouse, and the modern palaces of the archdukes and others of the nobility. Other noteworthy structures include the city hall, the Hofburg Theater, the municipal library, the Cathedral of Saint Stephen, the Chamber of Commerce, the Imperial Opera, the Albertina Library, and the central railroad station. Schönbrunn, the imperial summer residence, is about two miles from the city.

Vienna is the intellectual center of Austria-Hungary. It contains many famous churches and religious associations, numerous schools and institutions of secondary learning, and a fine university. It has the Vienna Conservatory of Music, the Polytechnic Institution, the Austrian Museum of Art, and the Military Geographical Institute. The imperial library has 900,000 volumes and about 25,000 manuscripts, and in connection with it is one of the finest imperial museums of Europe. Besides well-organized kindergarten and elementary schools, the city has a military institution, an agricultural academy, a conservatorium of music, many commercial colleges, numerous Protestant and Roman Catholic theological seminaries, and various institutions of science, art, industry, and technical learning. The noted monuments include one to Schiller, in Schillerplatz; one to Joseph II., in Josephplatz; one of Goethe, near the Palace of Justice; one of Schubert, in the Stadt Park; one of Beethoven, near the Academic Museum; and one to Prince Eugene, in Burgplatz. Fine specimens of paintings by Dürer, Rubens, and other masters are in the picture gallery of the Belvedere Palace, formerly a residence of Prince Eugene. The regalia of Charlemagne and other imperial treasures are stored in the treasury.

The streets of Vienna are paved substantially and provided with all the modern facilities. It has gas and electric lighting, an extensive electric street railway system, waterworks, sewerage, and well-organized police and fire departments. Whether the visitor desires to attend the Cathedral of Saint Stephen, containing the tombs of Frederick III. and Prince Eugene of Savoy, or view the other beautiful churches, the palaces, monuments, or public parks, it is possible to reach them all by modern rapid transit, carriages, or cabs. Like Paris, the city is remarkable for the extensive use of bicycles and automobiles upon its streets. Vienna is not only the center of art and education in Austria, but of its manufacturing and commercial industries. The extensive system of railways and navigation on the Danube facilitate a large interior and export trade. Among the manufactures are leather, soap, cotton and silk textiles, paper, woolens, carriages, velvet, musical instruments, embroidery, porcelain, firearms, machinery, sailing vessels, boilers, and engines. The meerschaum pipes, musical instruments, and bent-wood furniture made in Vienna are exported in large quantities.

The site occupied by Vienna was originally a part of the Celtic settlements of Europe. A military post, called Vindobona, was established here by the Romans, and it was the place where Marcus Aurelius died in 108. When the barbaric tribes occupied the territory of ancient Rome, it was taken by the Huns under Attila, but its growth dates from the time of the Crusades, when it became the center of a considerable trade. The Hapsburgs made it their capital in 1276, after which it passed into history as the scene of many memorable military contests. In 1477 the Hungarians besieged it unsuccessfully. It was defended successfully against the Turks under Sultan Solyman the Magnificent in 1529 and a second Turkish invasion in 1683. Under Ferdinand I. it became the seat of the German emperors. The Congress of Vienna assembled here on Nov. 1, 1814, to organize the affairs of Europe after the first overthrow of Napoleon, but the escape of that military leader from Elba, in 1815, broke up the conference, although its acts were formally sanctioned by the powers on June 9, 1815. A large majority of the inhabitants are Roman Catholics. About 75,000 Jews reside in the city. German is the spoken language. Population, 1920, 2,030,850.

VIENNA, Congress of, a convention of the leading nations of Europe, held at Vienna, Austria, in 1814. It was called for the purpose of settling the affairs of Europe after the wars of Napoleon and convened on Sept. 30, 1814. Among the countries represented were Austria, England, France, Prussia, Portugal, Russia, Sweden, and Spain, but representatives were present from all the larger countries except Turkey. The rulers who attended in person included Emperor Francis of Austria, Alexander I. of Russia, and Frederick William III. of Prussia. Among the chief adjustments of territory were included the annexation of Lombardy and Venice to Austria; the erection of Belgium and Holland into a kingdom under William I.; the annexation of Savoy and Piedmont to the kingdom of Sardinia; the retention of Malta and Helgoland by Great Britain, of which the Hanover dynasty was given dominion; the retention of Naples, by Murat; the establishment of a constitution for Germany; and the annexation of Swedish Pomerania, a part of Saxony, the Rhine province, and the duchy of Posen to Prussia. Additional provisions included that Norway should be retained by Sweden, that Denmark and Lauenburg should be united, that the duchy of Warsaw be made a part of Russia, and that Cracow be erected as a free state under the protectorate of Austria, Prussia, and Russia. In February, 1815, Napoleon suddenly escaped from Elba. This caused the congress to disperse immediately, but its provisions were carried out after the fall of Napoleon in that year. The treaty was finally signed on June 9, 1815.

VIENNA, University of, an institution of higher learning in Vienna, Austria, one of the most celebrated of Europe. It was founded by Duke Rudolph IV. in 1365, but its period of prosperity began in 1384, when a theological faculty was added. The Jesuits obtained control of it under Ferdinand II., in 1623, when it was greatly enlarged by the addition of numerous buildings, and it has since maintained a high position, especially for its medical department. The institution now has faculties of medicine, theology, law and political science, and philosophy. With it are affiliated a number of museums, seminaries, colleges, medical clinics, and laboratories in art and science. Maria Theresa founded its library in 1775, which now contains 600,500 volumes. The attendance averages 6,125 students, many coming from abroad.

VIEUXTEMPS (vyē-tän′), **Henri,** violinist and composer, born in Verviers, Belgium, Feb. 20, 1820; died June 6, 1881. He began to study the violin when five years of age and in 1833 made a tour of Germany. Later he studied music under Simon Sechter in Vienna. He made successful tours of Moscow, Saint Petersburg, and other European cities and became solo violinist to the Czar of Russia in 1846. In 1871 he was made professor of the violin at the Conservatory at Brussels, but was soon after stricken with paralysis. As a violin virtuosi and a composer of music he took high rank.

VIGFÚSSON (vĭg′fo͞o-sŭn), **Gudbrand,** educator and author, born in Frakkanes, Iceland, March 13, 1827; died in Oxford, England, Jan. 31, 1889. After studying at Reikiavik, he attended the University of Copenhagen, and made the Danish capital his residence from 1849 to 1864. In the latter year he went to England, where he busied himself for ten years on the *Icelandic Dictionary.* He was made professor of the Icelandic language and literature at Oxford in 1884, which position he held until his death. His chief writings include "An Icelandic Reader," "Timatal," an essay on the chronology of the Icelandic Sagas, and "Stulunga Saga." These works have been widely translated.

VIGNAUD (vē-nyō′), **Henry,** diplomat and author, born in New Orleans, La., Nov. 27, 1830. He began teaching in 1852 and occasionally contributed to newspapers in New Orleans. In 1857 he founded *L'Union de La Fourche,* a French newspaper at Thibodaux, La. Subsequently he was one of the founders of *La Renaissance Louisianaise* at New Orleans, but at the beginning of the Civil War joined the Confederate army as captain. He was made assistant secretary of the Confederate diplomatic commission in Paris in 1863, and in 1869 became secretary of the Rumanian legation in Paris. In 1872 he served as translator at Geneva to the Alabama claims commission, in 1875 entered the diplomatic service of the United States, and for some time was secretary in the United States embassy at Paris. He published "Toscanelli and Columbus—the Letter and Chart of Toscanelli on the Route to the Indies by Way of the West" and "Critical and Biographical Notices of all Voyages which Preceded and Prepared the Discovery of the Route to the Indies by Diaz and to America by Columbus."

VIGNY (vēn-yē′), **Alfred,** poet, born at Loches, France, March 27, 1799; died Sept. 18, 1863. He entered the military service in 1816, but retired after eight years to devote himself to a literary pursuit. His writings belong to the romantic school and may be classed with the leading poetical productions of France in the last century. Besides producing a large number of poems, he wrote several novels and dramas. "Chatterton" is his leading drama and "Cinq-Mars," an historical novel, is considered his best work in prose. Among his leading poems are "Eloa," "Poèmes," and "Le Déluge."

VILAS (vī′lạs), **William Freeman,** statesman, born in Chelsea, Vt., July 9, 1840; died Aug. 29, 1908. His parents removed to Madison, Wis., in 1851, and he graduated from the Wisconsin State University in 1858. After studying law in the Albany Law School, New York, he was admitted to the bar, and at the outbreak of the Civil War entered the Union service. In

1863 he resigned to practice law at Madison, and shortly after became trustee of the University Law School. He served in the Wisconsin Legislature one term. President Cleveland appointed him Postmaster-General in 1885, and later made him Secretary of the Interior. He became a member of the United States Senate in 1891 and in 1896 supported the single gold standard movement. He aided in editing the *Wisconsin Supreme Court Reports.*



WILLIAM F. VILLAS.

VILLAFRANCA (vēl-lä-frän'kä), a town of northern Italy, nine miles southwest of Verona, on the Tartaro River. Formerly it was strongly fortified and played an important part in the military movements of Southern Europe. The Austrians under General Radetzky defeated the Sardinians under King Charles Albert at Villafranca on July 25, 1848, and the Italians were defeated here by the Austrians on Jan. 24, 1886. The Treaty of Villafranca, concluded July 11, 1859, between Francis Joseph of Austria and Napoleon III., terminated the Italian war and conveyed Lombardy to Victor Emmanuel of Sardinia.

VILLARI (vēl'lä-rē), **Pasquale,** historian, born at Naples, Italy, October 3, 1827. He studied law at the University of Naples, but was forced to leave the country for taking part in the revolutionary movement of 1848-1849. Subsequently he studied and resided at Florence, and in 1859 became professor of history in the University of Pisa. For several years he was general secretary of public instruction, was chosen deputy in 1867, and became senator in 1884. He was minister of public instruction from 1891 to 1892, in which capacity he gathered material for a number of reports, and subsequently devoted his attention mainly to historical writings. Among his works are "First Two Centuries of Florentine History" and "Life of Girolamo Savonarola."

VILLARS (vē-lär'), **Claude Louis Hector,** eminent military leader, born in Moulins, France, May, 8, 1653; died in Turin, Italy, June 17, 1734. He was the son of the Marquis de Villars and, after studying at the College of Juilly, entered the army as a volunteer. His first services in Holland were under Louis XIV., and he soon became distinguished as a gallant soldier. Later he served under Condé and Turenne in Germany, where he was made commander of a troop of horsemen in 1674. He was promoted to the rank of lieutenant general in 1693, and represented the French at the court of Vienna from 1686 until 1701. In 1702 he was sent to coöperate with the Elector of Bavaria in the War of the Spanish Succession and on Oct. 14 of that year defeated Prince Louis of Baden at Friedlengen, receiving for his services promotion to the marshalship. In 1703 he defeated the Prince of Baden at Hochstadt and soon after captured a number of towns in Germany. He was sent to supersede Vendome in Flanders in 1709, and was seriously wounded at the Battle of Malplaquet against Eugene and Marlborough. His successes in 1712 at Denain and Landrecies hastened the Peace of Utrecht, in 1713, and his series of successes against Eugene brought about the Peace of Rastadt in 1714. When the war with Austria was renewed, in 1733, he was made marshal general of France and sent into Italy with a large army. His death occurred while on his return to France after a successful campaign. Villars ranks as one of the greatest generals of the age of Louis XIV.

VILLEIN (vĭl'lĭn), the name of a particular kind of feudal serf, who occupied a middle position between the freeman and the menial serf. Some writers call all the peasants of the Middle Ages, whether free or unfree, villeins. According to others, all free peasants were termed villeins to distinguish them from those bound to the soil. The term had a local significance in some sections, where the villein occupied a portion of land at the will of the landlord, but he was required to perform menial labor. Usually the villeinage descended in regular succession from father to son, but later the villeins were permitted to occupy the lands only as a consideration for performing work in a satisfactory manner. After the serfs of this class acquired their freedom, they still continued their services as a condition of the tenure, but they came to be known as *half* or *full* villeins according to the size of the plat of ground held by the individual. The former had reference to about fifteen and the latter to thirty acres, while a tract of 120 acres was known as *a hide.* See **Serf.**

VILLI (vĭl'lī), the small conical projections of the mucous membrane of the small intestine. They contain some muscular fibers and each villus has an artery, a vein, and one or more capillaries. The function of the villi is to absorb the nutritious matter from the digested food, which is taken up by the lacteals situated immediately back of the villi. The lacteals, during intestinal absorption, become distended with a whitish or bluish fluid called chyle. Small tubes run from each villus into larger ones lying in the mesentery. These tubes terminate in firm roundish bodies called mesenteric glands. Threadlike tubes lead from these glands to a larger tube, the thoracic duct, situated in front of the vertebral column. This duct is from eighteen to twenty inches long, has numerous valves opening toward the neck, and discharges into the left subclavian vein.

VILLIERS (vĭl'lērz). See **Buckingham.**

VILNA (vĭl'nä), a city of Russia, in the government of Vilna, about 470 miles southwest of Saint Petersburg. It has good railroad facilities, is surrounded by a fertile farming and

dairying country, and is the center of a large trade in grain, live stock, and timber. The chief buildings include the Cathedral of Saint Stanislaus, the Cathedral of the Holy Virgin, the Church of Saint Nicholas, the city hall, the public library, the university, and several synagogues. The university has a fine museum of antiquities, an observatory, and botanical and zoölogical gardens. Among the principal manufactures are leather, soap, earthenware, farming implements, lumber products, clothing, and machinery. The streets are paved substantially. They are lighted with gas and electricity and traversed by electric street railways. The municipality has extensive systems of waterworks and sewerage. Vilna was founded in the 10th century and was annexed to Russia in 1795. It was captured by the Germans in 1915. Population, 1915, 198,680.

VINCENNES (vĭn-sĕnz′) a city of Indiana, county seat of Knox County, on the Wabash River, 100 miles southwest of Indianapolis. It is on the Baltimore and Ohio Southwestern, the Evansville and Terre Haute, the Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads. The surrounding country is fertile, producing grain, hay, and vegetables. Among the noteworthy buildings are the county courthouse, the high school, the public library, the Vincennes University, the Cathedral Library, and the Saint Rose Female Academy. The manufactures include furniture, flour, farming implements, woolen goods, clothing, machinery, and earthenware. It has a growing trade in cereals, live stock, and merchandise. Vincennes is the oldest city of Indiana. It was settled in 1702 by the French. From 1801 to 1816 it was the capital of Indiana. It was chartered as a city in 1856. Population, 1920, 17,210.

VINCENT (vĭn′sẹnt), **John Heyl,** clergyman and author, born in Tuscaloosa, Ala., Feb. 23, 1832; died May 9, 1920. After studying in Lewisburg and Milton, Pennsylvania, he studied at the Wesleyan Institute, and soon after was given a pastoral charge in Illinois. In 1865 he established the *Sunday-School Quarterly* and the following year founded the *Sunday-School Teacher,* the latter containing his modern lesson system, which has since become international. Vincent was one of the chief organizers of the Chautauqua Assembly. He became editor of the Sunday school and tract publications of the Methodist Church in 1868 and was elected bishop at the general conference in 1888, with his residence at Topeka, Kan. In 1900 he was made resident bishop in Europe, with his episcopal residence at Zurich, Switzerland. His publications include "Studies in Young Life," "Chautauqua Text-Books," "The Story of a Letter," "My Mother," and "The Earthly Footsteps of the Man of Galilee."

VINCI (vĭn′chē), **Leonardo da,** famous painter and sculptor, born near Florence, Italy, in 1452; died near Amboise, France, May 2, 1519. He was the son of Pietro da Vinci, a notary of Florence, and was distinguished as a student in mathematics, literature, botany, and physics. His natural skill in the arts of design caused his father to place him in the studio of Andrea del Verrocchio, a painter and sculptor, whom he soon surpassed. The Duke of Milan employed him in 1482 for artistic work and engineering, and while at Milan he frescoed "The Last Supper," a fine production in a Milanese convent. In 1499 he visited Florence, where he painted his famous portrait known as "La Gioconda," now in the Louvre of Paris. The Pope made him chief engineer and architect of the army in 1502, in which capacity he visited and inspected many of the fortified places in the papal states. He returned to Milan in 1507, where he painted the "Madonna and Child." In 1516 he accompanied Francis I. as court painter to France. Among his best known achievements are an equestrian statue of Francesco Sforza, the designs for the canal of Martesana, at Milan, and portraits of a number of distinguished sovereigns. "The Adoration of the Kings" is one of his finest paintings. Vinci was one of the most learned men of his times, as well as a noted painter and sculptor. The casket containing his remains was placed in the palace of Amboise in 1874, under the protection of the Count of Paris.

VINE. See **Grape.**

VINEGAR (vĭn′ē-gẽr), an acid liquid obtained from an alcoholic liquid, usually cider or wine, used as a condiment and a preservative. In countries producing large quantities of wine, it is obtained from inferior grades of wines by acetous fermentation, but it is produced largely from malt. Malt vinegar contains four to six per cent. of acetic acid. It has a reddish-brown color and is quite highly esteemed. Crabs or sour apples are used largely in the manufacture of vinegar, but the product has neither the strength nor the flavor of the product made from wine.

Large quantities of *cider vinegar,* a grade deemed best in general household use, are made in the cider districts, especially in the regions growing large quantities of apples, pears, and peaches. Sugar is usually added to a very acid cider, thus giving the product a finer flavor and a less acid taste, but the cider made of a better grade of fruit is simply the fermented juice. The processes of making cider from fruit and malt are quite similar, the expressed juices being placed in casks about three-quarters full and exposed to the air at a temperature of about 70°. If the proper amount of air and warmth, two essential conditions, are supplied, fermentation takes place rapidly. After the vinous fermentation has taken place, the vinegar is filtered, cleared, and drawn off into casks.

White vinegar is made by distilling either malt or wine vinegar and has about the same essential principles as the vinegar from which

it is derived, but contains four to seven per cent. of acetic acid. *German vinegar* is made by passing malt or fermented wort over wood shavings in the presence of air. Vinegar may be obtained from all liquids which are capable of undergoing vinous fermentation. The cereals used extensively at present include rye and corn, a bushel of the latter yielding about four gallons of vinegar. The leading vinegar-producing region includes Missouri, New York, Ohio, Pennsylvania, Michigan, California, and Ontario. Vinegar is adulterated by adding sulphuric and sulphurous acids, which may be detected by boiling a quantity to which chloride of calcium has been added.

VINLAND, or **Wineland**, the name applied to that part of North America which was visited by the Vikings of Norway. In 986 this region was visited by Bjarne Herjulfson while on his way to Greenland, and Leif Ericson made an expedition to it in the year 1001. He named the country Vinland, owing to the abundance of wild grapes found at the time. It is not certain to what region the name has reference, but it is usually applied to the coast lying between Delaware and Nova Scotia. Some writers applied the name Vinland in particular to New England, while Nova Scotia is termed Markland and Newfoundland is called Helluland. These three names appear to have been applied by Leif Ericson to regions corresponding to the sections mentioned. Remains of an old mill at Newport and the Dighton Rock have been assigned in popular belief to the Norsemen, who are supposed to have formed settlements in America, but it is more probable that the former was erected by early English settlers in Rhode Island and that Indians located and inscribed the latter.

VINTON (vĭn'tŭn), **Alexander Hamilton,** clergyman and author, born in Providence, R. I., May 2, 1807; died in Philadelphia, Pa., April 26, 1881. He was the brother of David Hammond Vinton (1803-1873), an American soldier of the Mexican and Civil Wars. After studying at Brown University, he pursued a course at the Yale Medical School, and practiced his profession at Pomfret until 1832. He took up the study of theology at the Protestant Episcopal Seminary, New York, and successively filled pastorates in Portland, Boston, Philadelphia, and New York City. His chief publication is "Lectures on Evidences of Christianity."

VIOL (vī'ŭl), an ancient stringed musical instrument, the forerunner of the modern violin. It was constructed similar in shape to the violin and was furnished with six or more strings, the tones of which were regulated by being brought into contact with frets placed at regular intervals along the neck, for which purpose the fingers were used as in the violin. A bow was used to play the instrument. Three kinds of viols were in use, known as the treble, the tenor, and the base. The last mentioned was sometimes called *viol da gamba,* from the fact that it was held between the legs of the performer. It has been superseded in modern times by the violoncello.

VIOLET (vī'ō-lĕt), a large genus of herbaceous plants, which are found in most parts of the globe, including about 200 well-marked species. The species native to North America are usually low herbs, either stemless, as the *common blue violet* and the *bird's-foot violet,* or with short leafy stems, as the *dogtooth violet,* and the *Canada violet.* The flowers are solitary, or rarely in pairs, growing at the end of slender axillary flower stalks. Most species have flowers of irregular form, with five sepals prolonged at the base and five petals, the larger one occurring at the lower part and provided with a spur. Many of the violets are blue, and the typical violet of literature is always so. Some have fine fragrance and some are scentless. The species range in shades from the deepest blue to yellow and white. The common *sweet violet* and the *violet tricolor* are popular species and are grown extensively in gardens. Others include the *hooded violet, larkspur violet,* and *leafy-stemmed violet.* The pansies grown in flower gardens are a variety of the violet tricolor and are obtained by propagation. They are generally popular for cultivation in gardens.



COMMON BLUE VIOLET.

VIOLIN (vī-ō-lĭn'), the most important modern stringed instrument of the viol class, having four strings of catgut. It is played with a *bow.* The lowest string is covered with silver-copper wire and the bow is strung with horsehair. A hollow wooden *body,* usually of pine, maple, or sycamore, forms the larger part of the instrument, and to it is attached a solid wooden *handle* or *neck.* The strings are fastened to a *tailpiece* at one end of the chest or body, passing over a small wooden or bone *bridge,* and kept in tune and position by a series of *keys* at the end of the neck. Two *f* holes, so called from their similarity to the shape of that letter, are cut in the upper side of the body. The hairs of the bow are charged with rosin, thus producing the sound as the bow is drawn across the strings. The different notes of the musical scale are produced by stop-

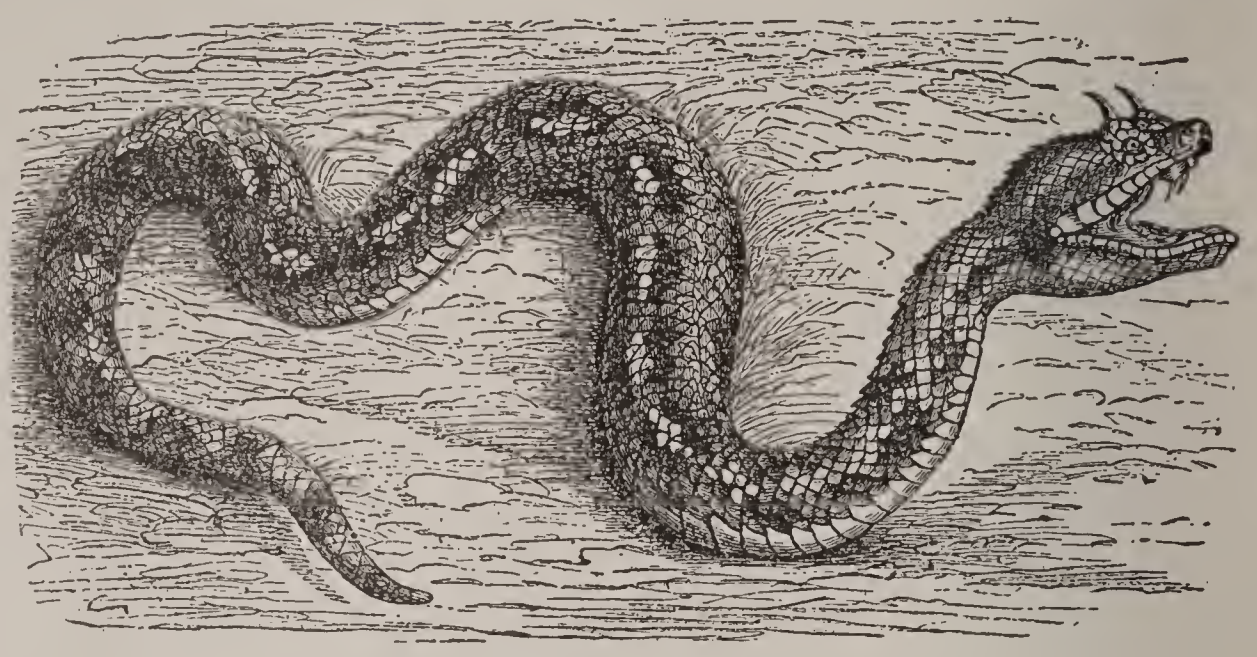
ping the strings with the fingers of the left hand against the finger board on the handle, thus shortening the vibrating portion. Nearly all the different parts of violins are fastened together with glue. It is noteworthy that the finest violins were made about 200 years ago, and some of them have a value at present ranging from $1,500 to $3,000.

Various characteristics of a violin determine the quality of its tone, including the varnish, the fineness and thinness of the wood, the sounding holes, the curvings and arches, and the seasoning of the materials. The precise cause of the superiority of the older instruments has never been satisfactorily explained, neither has it been possible to construct instruments either equal or superior to them. Violins of the highest quality come from Italy, especially from Cremona, Milan, Venice, Brescia, and Mantua. Stradivarius, a native of Cremona, was the greatest of all violin makers. Jacobs, Klotz, and Stainer were the most eminent among the Germans, Vuillaume among the French, and Fox and Forrest among the English.

The violin originated from the *viol,* a stringed musical instrument of the Middle Ages, having from five to seven strings and being played with a bow. It was considerably smaller than the violin and resembled the guitar in having the finger board divided by frets. An instrument larger than the violin, but resembling it, is called a *violoncello.* The Anglo-Saxons called the violin a *fythel,* hence it is frequently called a *fiddle.* The climate of Italy is especially adapted to the making of excellent violin strings, but the largest manufactures of violins are now in Germany and France. Among the eminent players on the violin are Schnittelbach of Lübeck, Louis Spohr (1784-1859), Ole Bull (q. v.), and Luigi Boccherini (1740-1806).

VIOLONCELLO (vē-ō-lŏn-chĕl'lō), a musical instrument of the violin family, which ranks immediately between the viola and the double base, being an octave lower than the former and an octave higher than the latter. The performer holds the instrument between the knees. It has four strings, the two lowest covered with silver wire, and is played upon by a bow. The instrument is tuned in fifths, A, D, G, and C, and is eminently rich and expressive in tone.

VIPER (vī'pĕr), a venomous serpent native to the Old World, including two or three species which differ slightly in color. The appearance is similar to the rattlesnake of America, but there are no rattles on the tail, and they have no teeth in the upper jaw aside from the two hollow poison fangs. The best known species include the *common viper,* or *adder,* of Europe; the *horned viper,* or *asp,* of Africa; and the *Russell,* a small viper of India. In Western Europe the common viper is the only poisonous snake. It has a brownish-yellow color, marked



HORNED VIPER.

with black triangular spots, and its bite is not specially fatal, but it is quite painful and frequently produces fever and sickness. Vipers are viviparous animals, their eggs remaining within the body until fully incubated. Most species are good swimmers, but they generally inhabit dry woods and heaths. They feed on small birds, frogs, mice, and insects. The common viper of Europe is about two feet long, but the species native to India attain a length of five to six feet. The *black viper* of North America is an allied species.

VIRCHOW (vĕr'chou), **Rudolf,** pathologist and author, born in Schivelbein, Germany, Oct. 13, 1821; died Sept. 5, 1902. He studied in his native town and entered the University of Berlin, where he graduated as a medical student in 1843. He was soon after made lecturer on anatomy at the University of Berlin, but, entering the political arena as a leader of the liberal party, he was deprived of his lectureship by the government in 1849. In the



RUDOLF VIRCHOW.

same year he was called to the chair of pathological anatomy in the University of Würzburg, where he labored with remarkable success until 1856, when he was recalled to his former position in the University of Berlin and made director of the Pathological Institute. He was elected to the Reichstag in 1880, serving on a number of important commissions, and was noted as a political opponent of Bismarck. In 1888 he treated Frederick III., who was afflicted with a cancerous disease, and thus became known to the world as an ultimate authority on pathology. His policy in government was directed with the view of aiding the laboring and industrial classes.

Virchow attained eminence by traveling in Asia Minor, Nubia, and Egypt, partly in company with Schliemann, and published a number of excellent works on anthropology. Among the distinguished honors bestowed upon him are memberships in the London Royal Society of Medicine in 1856, in the French Academy of Medicine in 1859, and in the Berlin Academy of Sciences in 1873. His "Cellular Pathology" is one of his most important works and has gone through many editions and translations. Other publications include "On Post-Mortem Examination," "Freedom of Science in the Modern State," "Alimentation and Well-Being," "Collection of Treatises on Scientific Medicine," "Lectures on Life and Illness," "Function of Science in the New National Life of Germany," "Treatise on the Theory of Trichinae," "Goethe as a Naturalist," and "Lectures on Pathology."

VIREO (vĭr′ē-ō), or **Greenlet,** a family of insect-catching birds. They are restricted to the American continent and range from Canada to Paraguay. About sixty species have been enumerated, including many birds of rare plumage and beautiful song. The representative species are about six inches long, with an alar extent of ten inches. The predominating color is dull green and yellowish, the bill is conical, and the nostrils are overhung by membrane. They build their cup-shaped nest of tough fiber of the inner bark of plants, instead of the more brittle grasses, and suspend it from the twigs of bushes and trees. The nest is lined with soft materials, such as wool and soft grasses, and the parts are carefully glued together with saliva. Most species are migratory, visiting the higher latitudes in May and returning in the fall to the tropical regions. The species common to Canada and the United States include the *warbling vireo,* the *red-eyed vireo,* the *yellow-throated vireo,* the *blue-headed vireo,* and the *white-eyed vireo.*

VIRGIL (vĕr′jĭl), **Publius Virgilius Maro,** famous Roman poet, born near Mantua, in Northern Italy, Oct. 15, 70; died in Brundusium, Sept. 22, in the year 19 B. C. He was the son of a small landowner, who tilled a farm on the banks of the Mincion, in the district of Andes. The scenery with which he came in contact in early life inspired him in many of his poetical productions. His father recognized his natural ability and devotion to study and gave him the advantages of a careful education. It is possible that his diligence in study was enhanced by the fact that he was not a Roman citizen by birth, thus checking any aspirations he might have formed to become eminent as a soldier, orator, or statesman. He first studied at Cremona and Milan, but in 55 became a student of Greek and philosophy under Syron in Naples.



VIRGIL.

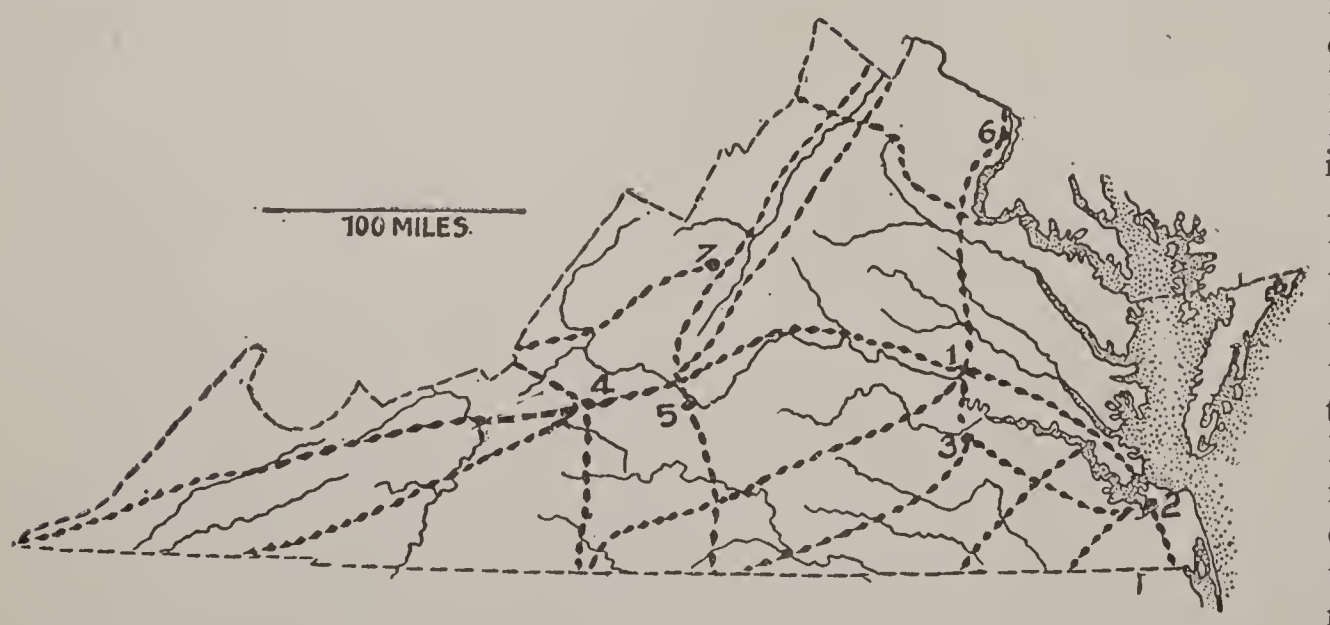
It appears that Virgil returned to his father's farm with the view of devoting his life to poetry and agriculture, but, as Mantua had sympathized with the opponents of Antony and Octavius, the lands were confiscated after the Battle of Philippi in 42 B. C. However, he succeeded in recovering his estate by reason of friendship with Asinius Pollio, the Roman governor, and soon after formed the acquaintance of Octavius. When the latter became Augustus, after the Battle of Actium, in 31 B. C., the poet was remembered by the distinguished Roman sovereign. He resided for some time at Rome, where he formed a firm friendship with Varro, Maecenas, and Horace, but spent most of his life in retirement, after 37 B. C., on his estate near Naples, where most of his famous writings were completed. The larger part of his great work, the "Aeneid," was written before 19 B. C., but in that year he went to Athens with the view of revising the poem in some particulars, and while there Augustus returned from the East. The latter persuaded him to sail in his company to Italy, but the strain of exposure at sea caused his delicate constitution to fail and he died at Brundusium, shortly after reaching Italy. His body was placed in a tomb at Naples, which was long visited with sacred reverence by many Romans.

The fame of Virgil rests on three celebrated works, entitled the "Eclogues," the "Georgics," and the "Aeneid," though the last mentioned is considered the most remarkable. The "Eclogues," comprising ten poems, were written about 40 B. C. Though devoted largely to poems of a pastoral character, they include many allusions to the current political events. The "Georgics," a work properly regarded the most highly finished of Virgil's poetry, are addressed to Maecenas and probably were written at his suggestion. They treat of agriculture as connected with the life and times of the author. Four volumes make up the "Georgics," in which is given a poetic description of the culture of the vine and other fruits, the rearing and care of domestic animals, and the care of bees. They include

a fine presentation of the climatic conditions of Italy and the changes of weather, and include a description of the appearance of the firmament in northern Italy.

The "Aeneid" is in twelve books, the first six being modeled after the "Odyssey," and the last six after the "Iliad." Virgil makes Aeneas the subject of this remarkable work. He is represented as fleeing from Troy, after that city had fallen under the attacks of the Greeks, and after many adventures he lands in Latium, where he becomes the husband of Lavinia, daughter of King Latinus, and, after subduing his enemies, he lays the foundation of the Roman nation. Though a work of refinement of expression and elegant construction, it is inferior to the Homeric poems. It was not wholly completed to his liking at the time of his death, and he preferred to destroy rather than leave it in an incomplete condition, but Augustus prevailed upon him to intrust the revision of the work to his friends, Varro and Tuacca. These writers edited it with great care, and it is possible that a number of interpolations were made. The Romans regarded him with religious veneration, and he impresses modern readers as one who lived in a much higher sphere than his contemporaries. Many translations have been made from Virgil, the best in the English being by William Morris and the best in the German by Richard Wagner.

VIRGINIA (vẽr-jĭn'ĭ-à), one of the original thirteen states of the United States, popularly called the *Old Dominion*. It is bounded on the north by West Virginia and Maryland, east by Maryland, Chesapeake Bay, and the Atlantic Ocean, south by North Carolina and Tennessee, and west by Kentucky and West Virginia. In shape it is a triangle, the apex being in the north. The southern boundary is a straight line 438 miles long, and the greatest breadth from north to south is 192 miles. It has an area of 42,450 miles, which includes 2,325 square miles of water surface.



VIRGINIA.

1, Richmond; 2, Norfolk; 3, Petersburg; 4: Roanoke; 5, Lynchburg; 6, Alexandria; 7, Staunton. Chief railroads are shown by dotted lines.

DESCRIPTION. The eastern part belongs to the Atlantic coast plain, which includes the tidewater country and a portion of the Piedmont plain. In the western part are ranges of the Appalachian highlands, with summits that approximate altitudes of 5,700 feet. There is a general rise toward the northwest, the eastern part being low and more or less undulating, but rising in a series of belts until the highlands are reached. The tidal shore line, which is about 1,500 miles long, rises from a few feet to fully 75 feet above sea level. Among the mountain ranges of Virginia are the Blue Ridge, the North Allegheny, the Clinch, and the Cumberland mountains. Rogers Mountain, on the western border, has an elevation of 5,719 feet and is the highest summit in the State. The Cumberland mountains form the boundary between Virginia and Kentucky, and immediately west of the Blue Ridge is the famous valley of the Shenandoah. This valley is bounded on the west by the Alleghenies, in which are numerous limestone formations, including the famous Natural Bridge.

The greater part of the drainage belongs to the Atlantic coast plain. On the border between Virginia and Maryland is the Potomac, which drains the northern and eastern section of the State. It receives the inflow from the South Branch and the Shenandoah and flows into Chesapeake Bay by an extensive estuary. Among the streams that drain directly into Chesapeake Bay are the Rappahannock, the York, the Mattapony, and the James, which receives the inflow from the Appomattox. The Staunton flows into the Roanoke, which crosses the line into North Carolina and discharges into Albemarle Sound. About one-seventh of the State is drained by the Great Kanawha, the Holston, and the Clinch rivers into the Mississippi system. Deep gorges and numerous waterfalls characterize the rivers that flow through the mountainous section, and the streams that furnish drainage toward the east have escarpments to which navigation extends in the larger rivers. A portion of the State lies east of Chesapeake Bay and is organized into the two counties of Accomac and Northampton.

The climate is generally healthful, though sudden changes in temperature are frequent in the northwestern part. In the highlands the summers are cool and pleasant, but the higher altitudes have cold winters. The extremes in temperature range from 8° below zero in winter to a summer heat of about 98° in July. In the

eastern part the climate is much warmer and more uniform. Here the thermometer seldom falls below 10° and the maximum heat of summer is from 98° to 104°. All parts of the State have an abundance of rainfall, which ranges from 48 inches in the eastern part to about 35 inches in the Shenandoah Valley. Snowfall is abundant in the higher altitudes, but disappears on the early approach of spring.

MINING. The mineral deposits consist chiefly of coal and stone. At present about 4,825,000 tons of coal are produced annually, being a material increase the last five years. A large part of the product is used in manufacturing coke. Iron takes rank as the principal metal, and the output in tons is about one-eighth that of coal. Limestone, granite, gravel, and clays are abundant. Slate of a good quality is quarried in the Piedmont plain, and the mines of anthracite and bituminous coal are chiefly in the western part. Mineral waters obtained in Virginia yield large returns. Other mineral products include salt, ocher, lead, gold, silver, gypsum, manganese, zinc, and precious stones.

AGRICULTURE. Fully 78 per cent. of the area is included in farms, which average 118 acres. In the production of peanuts the State usually holds first rank. Corn is the leading cereal and the most important crop. It is followed in acreage by wheat, hay, and oats. Large interests are vested in the cultivation of tobacco, and a fine grade known as Virginia Leaf is exported extensively. Other crops include rye, buckwheat, cotton, peas, potatoes, sweet potatoes, and fruits. Vegetables of all kinds are cultivated extensively for the early markets in the North.

The interests in stock raising have grown without intermission through every decade since the Civil War. This circumstance is accounted for by the fact that the farmers appreciate the utility of mixed farming as a means of maintaining the fertility of the soil. The largest investments are represented by the cattle industry, both in the production of meat and the dairy products. Horses of a good grade are grown for domestic use and for export. Other farm animals include sheep, mules, swine, goats, and poultry. The better class of grazing land is in the western part, where clover and blue grass flourish.

MANUFACTURES. Noteworthy progress has been made in the quantity of the manufactures produced within the last decade. The output has more than doubled in value within the last twenty years. This is accounted for by the fact the State has much material to promote this enterprise, such as coal, iron, cotton, tobacco, lumber, and cereals. Tobacco products stand at the head of the list. They are followed closely by the output of flour and grist-mill products, lumber and timber products, and the manufactures derived from foundries and machine shops. Tanning is an extensive enterprise, owing to a large supply of oak bark within the forests of the State. Among the general manufactures are coke, canned fruits, cotton and woolen goods, cured and canned fish, spirituous liquors, quarry product, machinery, locomotives, railway cars, and farming implements. The oyster industry of Chesapeake Bay is an important factor among the industries. Richmond and Norfolk are the leading manufacturing cities.

TRANSPORTATION AND COMMERCE. The Atlantic Ocean and Chesapeake Bay afford fine harbors, and the rivers that discharge into the latter have extensive tide-water estuaries. One of the finest harbors along the Atlantic coast is on Hampton Roads, at the entrance of the James River into Chesapeake Bay. The State has 4,950 miles of railroads. Among the principal lines are the Chesapeake and Ohio, the Southern, the Atlantic Coast Line, the Baltimore and Ohio, the Norfolk and Western, and the Seaboard Air Line. Additional transportation facilities are provided by the James River, the Dismal Swamp Canal, the Kanawha Canal, and the Albemarle and Chesapeake Canal. The State has a large interior and ocean trade. Among the leading exports are tobacco, coal, cotton, fruits, iron, vegetables, and manufactured products.

GOVERNMENT. The present constitution was adopted in 1902. Executive authority is vested in the governor, lieutenant governor, secretary of State, treasurer, and auditor, each elected for four years by popular vote, except the auditor, who is chosen by the Legislature. Other State officials, including the superintendent of public instruction, are appointed either by the Governor or by certain boards and commissions. The Legislature consists of a senate and a house of delegates, the former chosen for four and the latter for two years. Membership in the senate cannot be less than 33 or more than 40, while the delegates in the house are limited to not less than 90 or more than 100. The supreme court of appeals consists of five judges and the State is divided into judicial districts, each of which has a judge elected for eight years. Lower courts, including justices of the peace, are chosen in the towns and cities. Local government is under the administration of the towns, cities, and counties.

EDUCATION. The public school system maintained at present was established in 1870, when ample provisions were made for the education of youth. A superintendent of public instruction, who is elected by the General Assembly for four years, has control of the educational work, but is assisted as a member of the board of education by the Governor and the Attorney-General. This board has been an important factor in enlarging the educational facilities, since it has general supervision of the school fund and may remove, with the consent of the senate, any county or city superintendent. All the schools, except the primary departments, are required to

be in session at least five months. Although separate schools are maintained for white and colored children, all have equal educational privileges. Illiteracy among whites is reported at 11.1 per cent. and among colored inhabitants at 44.6 per cent., but these figures are based on the population of ten years of age and upward.

Virginia has a large number of institutions of higher learning, some of which have been noted from an early date in the history of the country. Foremost among these are the University of Virginia, at Charlottesville; the College of William and Mary, at Williamsburg; the Richmond College, at Richmond; and the Washington and Lee University, at Lexington. Other institutions of higher learning include the Emory and Henry College, at Emory; the Randolph-Macon, at Ashland; the Virginia Union University, at Richmond; the Roanoke College, at Salem; the Hampden-Sydney College, at Hampden-Sydney; the Bridgewater College, at Bridgewater; the Saint John's College, Tidewater; and the Virginia Medical College, at Midland. Normal instruction for teachers is provided at the State Female Normal School, at Farmville; the Virginia Normal and Collegiate Institute, at Petersburg; the College of William and Mary, at Williamsburg; and the Hampton Normal and Agriculture College. Staunton has an institution for the deaf, dumb, and blind. Laurel is the seat of an industrial reform school for white boys. Insane asylums for whites are located at Marion, Staunton, and Williamsburg. Petersburg has an insane asylum for Negroes. The State penitentiary is situated at Richmond, which city likewise has a soldiers' home. A State farm is maintained to employ convicts, this enterprise having proved very satisfactory.

Inhabitants. Virginia has a small number of foreigners, only 19,461. There has been a noticeable increase in the urban population, owing to the material advancement in manufacturing enterprises. Richmond, on the James River, is the capital and largest city. Other cities include Norfolk, Petersburg, Roanoke, Newport News, Lynchburg, Portsmouth, Danville, Alexandria, Manchester, and Staunton. In 1900 it had a total population of 1,854,184. This included 660,722 Negroes. Population, 1920, 2,306,361.

History. Virginia was so named in honor of Queen Elizabeth, the virgin queen. The colonial history is of remarkable interest, especially because of its prominent connection with the early development of America. Sebastian Cabot explored its shores in 1498 and Verrazano visited the region in 1524. Sir Walter Raleigh subsequently surveyed the coast, and a grant of the land was made to the London Company in 1606. The first permanent settlement of the English in America was made at Jamestown on May 13, 1607, and here also met the first representative assembly. Negro slavery was introduced in 1619, when a Dutch man-of-war brought twenty slaves to the colony, and afterward a large slave trade was conducted by the English. Virginia was prominent in protesting against the legislative measures of Great Britain, especially the Stamp Act, and furnished such noted men as Jefferson, Washington, Madison, the Lees, and Henry in the Revolutionary period. It was a noted battle ground of the Revolution. At Yorktown, on the York River, occurred the surrender of Cornwallis in 1781.

Many citizens of Virginia supported the Union in the War of 1812 and the Mexican War of 1846-1847. In 1859 John Brown made his famous raid at Harper's Ferry, but the citizens of the State did their utmost to avoid the Civil War by calling a peace convention. An ordinance of secession was finally passed on April 27, 1861, which was ratified by a popular vote on May 23, 1861. Richmond was the capital of the Southern Confederacy and the State was the scene of many great battles, thus causing it to suffer more than any other State in the armed contest. Lee surrendered on Virginia soil, at Appomattox Court House, in 1865, and the State was readmitted Jan. 26, 1870. Since the war it has increased rapidly in wealth and population. The constitution adopted in 1902 has for its purpose the reform of elections, limiting the right of franchise somewhat. In 1907 the Jamestown Tri-Centennial was held at Norfolk, near the mouth of the James, to commemorate the first English settlement in America. Seven natives of Virginia have become President of the United States.

VIRGINIA, a city of Minnesota, in Saint Louis County, 54 miles northwest of Duluth. It is on the Great Northern, the Duluth and Iron Range, and other railroads, and is surrounded by a productive iron-mining country. The principal buildings include the public high school, a number of churches, and many business and office buildings. It has a large trade in merchandise and lumber. Extensive interests are vested in machine shops and industries connected with mining and shipping iron ore. Electric lights, sewerage, and a system of waterworks are among the public utilities. Population, 1905, 6,056; in 1920, 14,022.

VIRGINIA, University of, an institution of higher learning at Charlottesville, Va., the home of Thomas Jefferson, who founded it. The institution was chartered in 1819 and opened for instruction six years later. It maintains departments of law, medicine, agriculture, academic instruction, and engineering. In addition it has a number of closely affiliated schools. The property under its control has a valuation of $1,375,000, and the library contains a fine collection of 60,000 volumes. It has a faculty of 100 members and an attendance of about 1,000 students. Until 1904 the chairman of the faculty was the chief officer, but in that year Edwin Anderson Alderman was elected to the presidency.

VIRGINIA CITY, a city of Nevada, county

seat of Storey County, 52 miles southeast of Reno, on the Virginia and Truckee Railroad. It was long noted as the largest and most important of the State, but subsequently declined in population. The noteworthy buildings include the county courthouse, the high school, the Miners' Union Library, and many fine churches. It has systems of electric lighting, waterworks, and sanitary sewerage. The famous Comstock mines are near the city. It was first incorporated in 1864. In 1890 it had a population of 8,511; in 1900, 2,695; and in 1920, 1,200.

VIRGINIA CREEPER, a plant of the vine family, which climbs by rootlets as well as by disc-bearing tendrils. In some regions it is called *American ivy* and *woodbine.* It differs from the poison ivy in having five-parted leaves, while the latter has three-parted leaves. Its greenish flowers are not conspicuous and are followed by dark blue berries, while the leaves assume a bright scarlet color in autumn. The plant is cultivated as an ornamental creeper on the fronts of houses, old walls, and over lattice work, its growth often reaching heights of thirty to fifty feet. An allied plant has been introduced from Japan, but is less hardy in the northern part of the United States and Southern Canada. It has three-lobed leaves, which densely cover the walls of buildings.

VIRGIN ISLANDS, an island group of the West Indies, lying east of Porto Rico and comprising about 35 islands. They are of volcanic origin, but the soil is generally fertile and the climate is similar to that of Porto Rico. Among the principal productions are sugar, salt, ginger, molasses, rum, cotton, turmeric, and many varieties of fruit. Saint Thomas, Saint Croix, and Saint John are the most important. These islands since 1917 belonged to the United States; area, 118 sq. mi. Virgin Gorda, Anegada, and Tortola, being British, are governed from the colony of the Leeward Islands. Roadtown, on the south side of Tortola, is the capital and seat of local government. The British possessions have an area of 55 square miles and a population of 5,612. Columbus discovered the group, in 1494, and Tortola has been British since 1666. The entire group has an area of 270 square miles and a population of 43,688.

VIRGINIUS (vẽr-jĭn′ē-ŭs), **Lucius,** Roman centurion, famous for slaying his daughter to prevent her coming under the influence of Appius Claudius Crassus. Writers have made the story a favorite theme in literature, including Lessing, Leclerc, and Macready.

VIRGINIUS MASSACRE, the name given to the capture of an American merchant vessel by the *Tornado,* a Spanish man-of-war, on Oct. 31, 1873. The *Virginius* was employed in conveying arms and men to aid the Cubans in an insurrection, which was the cause of the capture. Four Cubans were found on board and were immediately executed, along with Captain Frye and 52 persons, including the crew and passengers. The Spaniards released the vessel and the passengers who were permitted to live. Those on board started for New York City, but the boat was abandoned off Cape Fear. This incident caused considerable trouble, but diplomatic negotiations were instrumental in averting war.

VIRGIN MARY. See **Mary.**

VIRUS (vī′rŭs), the name applied in medicine to fluids produced by diseased conditions or morbid processes in animals. In popular use the term is applied to the lymph used in vaccination, but physicians restrict it to the fluids that arise in such diseases as smallpox and measles. Virus is capable of developing disease when transmitted to other animal bodies.

VISE, a tool that has two jaws constructed so as to hold tight any material while work is done upon it. The jaws are fitted with a screw or lever, by which the movable jaw may be pressed tightly against the fixed jaw, thus holding secure the material upon which work is to be done, as in filing. Carpenters, machinists, and others use vises in their workshops. See **Screw.**

VISHNU (vĭsh′nōō), the second person of the divine trinity of the Hindus, the complete trinity consisting of Brahma, the creator; Vishnu, the preserver; and Siva, the destroyer. He is mentioned in the early writings of the Vedas as a manifestation of the sun, but in the epic poems known as the "Rámáyana" and the "Máhábhárata" a higher rank is given him in the divine essence. His office is to preserve and to do this he his to make ten descents to earth, called *avatars* or *incarnations.* Nine of these have already occurred, but the tenth is still looked for with much confidence. His first descent was to warn the righteous king Manu to save the sacred Vedas from an approaching deluge; the second, to support the world while the sea was disturbed; the third, to raise the submerged world; the fourth, to destroy an impious king; the fifth, to restore supremacy of the gods; and the sixth, to wash away the sins of the world. The seventh appearance of Vishu was in the form of Rama, the hero of the "Rámáyana;" the eighth as Krishna; and the ninth as Buddha. It is held that the tenth appearance will be as Kalki, or the White Horse, when he shall destroy the wicked and vouchsafe bliss to the righteous. Vishnu is represented in painting and statuary as having four arms, holding in each hand some symbolic object. At other times he is shown seated on a throne, or as riding on a being in the form of half man and half bird. The worship of Vishnu is largely among the middle classes.

VISIBLE SPEECH, a system of symbols to represent the articulate utterances of the organs of speech. It is based upon an exhaustive classification of the possible action of the organs involved in speech. Since these organs are alike in all persons and the movements in uttering sounds are the same, visible speech is in the form of a universal language. Every letter in

the system of letters, as well as every modification of the different characters, has an organical significance. The purpose of visible speech is to enable people of different languages to become able to communicate with each other and to facilitate communication among the deaf and dumb. Visible speech is an entire revolution in the method of communication, since it consists in a form of writing, and is thus based upon the actual movement of the organs of speech. It was devised by Alexander M. Bell, who lectured and wrote extensively upon the subject.

VISIGOTHS (vĭz'ĭ-gŏths). See **Goths.**

VISION (vĭsh'ŭn). See **Eye.**

VISTULA (vĭs'tū-lȧ), a river of Europe, which rises in northern Austrian Silesia and flows toward the northwest into the Baltic Sea, its waters passing into the Gulf of Dantzic. It courses through western Poland and eastern Germany. The length is 675 miles, of which 550 miles are navigable. The Vistula has falls of 200 feet in Silesia. Among the chief cities on its banks are Cracow, Warsaw, and Dantzic. Its tributaries include the Bug, San, and Brahe. Canals connect it with the Oder, the Dnieper, and the Niemen.

VISUAL SENSATION, the name applied to the phenomenon of sight which causes the sensation upon the vision to be of greater duration than that of the stimulus. Such a sensation may be noticed in a flash of light, which lasts longer than the time occupied by the light vibration acting on the retina. A single sensation is occasioned when two flashes occur near each other. To prevent fusion in the case of a strong light, the interval between the two must be more than one-thirtieth of a second, while in a faint light it must be more than one-tenth of a second. This is due to the fact that it is easier to distinguish differences of brightness between two faint lights than between two of great brilliancy, as between a dip and a wax candle, on the one hand, and two bright electric lights, on the other. Many double stars seen with small telescopes appear as single ones, and that two stars exist can be proven only by the more powerful instruments. When the distance between two stars subtends an angle less than sixty seconds, most people see them as one. Sensations of color depend on the wave length of the rays falling on the retina in a given time, as well as on the amount of white light falling on the same retinal area at the same time. The colored light sensations are diluted by the white light. Red, green, and violet are the three primary colors which cause retinal sensations.

VITEPSK (vĕ'tyĕpsk), or **Vitebsk,** a city in Russia, capital of the government of Vitepsk, 342 miles west of Moscow. It is finely situated on the Duna River, has good railroad facilities, and is surrounded by a fertile farming and dairying region. The features include the city hall, the government house, the church of Saint Michael, and the Cathedral of Saint Nicholas. Among the manufactures are tobacco products, furniture, sugar, and clothing. It has a large trade in farm produce, live stock, and timber. Formerly the place belonged to Poland, but it became a part of Russia in 1772. A large part of the inhabitants are Jews. Population, 108,234.

VITORIA, or **Vittoria,** a city of Spain, capital of the province of Alava, 30 miles south of Bilboa, on the Zadorra River. A large part of the place is not well improved, having narrow and gloomy streets, but the newer section contains many fine buildings and charming plazas. Among the principal buildings are the city hall, the governor's palace, the poorhouse, and the Cathedral of Santa Maria de Vitoria. Formerly the inhabitants were dependent entirely upon local enterprises, such as the manufacture of earthenware, leather, woolen textiles, and malt liquors, but the construction of railroads has enlarged these enterprises and promoted a growing trade. Vitoria has figured more or less prominently in several wars, especially in 1813, when Wellington gained a decisive victory over the French at this place. Population, 1920, 32,377.

VIVISECTION (vĭv-ĭ-sĕk'shŭn), the practice of cutting the living body of animals for the purpose of making physiological or pathological investigation. Vivisection on the lower forms of animal life has been the means of acquiring nearly all the knowledge we possess of the physiology of the human body. It was employed by Galen in 150 A. D., when he discovered that the artery contained blood instead of air as was formerly supposed. In 1628 William Harvey, by means of vivisection, learned that the blood passes from the heart through the arteries and returns again to the heart by means of the veins, in fact that the heart is the organ which propels the blood. Since that time vivisection has been employed very extensively, but it is condemned on the ground of cruelty in some countries, especially as sometimes practiced in the secondary schools.

Modern medical practice is based very largely upon the study of conditions of health and disease and the effect of medicine through vivisection. In most cases the operations are performed under anaesthetics, but where no cutting more severe than a superficial venesection is desired, the operations are done without anaesthesia. In 1907 the Royal Commission on Vivisection reported that 46,073 experiments were performed within that year in the United Kingdom, a majority of which were concerned in studying cancer, tuberculosis, rabies in dogs, and the effect of various drugs upon the heart and nerves. Vivisection is practiced extensively in the veterinary colleges in France and the United States, but in most countries a license is required from government officials to carry on such investigations.

VIZIER (vĭz'yĕr), or **Vizir,** a title given to high officials in Mohammedan countries, es-

pecially in the Ottoman Empire. The term was first used as a title of the prime minister and was conferred by Amulath I. on General Timurtash in 1386. Now the grand vizier is the highest officer in Turkey, next to the Sultan. In Turkey he is known as the *vizier-azam,* or the *sadr-azam.*

VLADIMIR (vlăd'ĭ-mĕr), called The Great, first Christian Emperor of Russia. He became Prince of Novgorod on the death of his father, in 972, but succeeded to the sole government of Russia, in 980, and reigned successfully until his death in 1014. Though a heathen at the time he ascended the throne, he became converted to Christianity, and was received into the Greek Church by baptism at Constantinople in 988. Many benefits were bestowed upon Russia in his reign of 35 years. He built churches, established schools, reformed the civil service, and laid the foundation for a powerful nation in the northern part of Europe. The Russian Church bestowed upon him the epithet of saint.

VLADIVOSTOK (vlă-dyĕ-vàs-tôk'), a city of Asiatic Russia, on the Gulf of Peter the Great, an inlet of the Sea of Japan. It is near the Corean frontier and forms the eastern terminus of the Trans-Siberian Railway. The harbor is well sheltered and commodious, ranging in depth from 30 to 75 feet, but the intense cold of winter makes it icebound for a number of months. The city is the chief naval station of Russia on the Pacific, having naval workshops and strong battery defenses, and its extensive transportation facilities make it a commercial center of importance. It has two naval schools and several institutions of secondary learning. The citizens maintain scientific and educational societies and excellent elementary schools. It is the seat of a number of churches and hospitals. Vladivostok is important as the center of extensive machine shops and dry docks. Among the manufactures are lumber products, utensils, cured fish, and implements. Population, 1918, 99,450.

VOGEL (fō'gẹl), **Julius,** statesman and journalist, born of German parents in London, England, in 1835; died March 13, 1899. He went to Melbourne, Australia, soon after the gold fields in Victoria were discovered, and, after engaging in business pursuits, became a journalist. Subsequently he removed to Dunedin, New Zealand, where he became a member of the local Parliament, and from 1876 to 1881 was agent-general in London. Vogel founded the first daily newspaper in New Zealand. He was knighted in 1875.

VOGLER (fōg'lẽr), **George Joseph,** organist and composer, born in Würzburg, Germany, June 15, 1749; died May 6, 1814. He studied at Bamberg and Mannheim and afterward proceeded to Rome, where he was ordained priest in 1773. Soon after he became a knight of the Golden Spur and was made chamberlain to the Pope. In 1775 he returned to Mannheim, where he became court chaplain, but soon after opened a school of music. In 1780 he made an extensive tour of Southern Europe. Later he visited remote districts of Asia and Africa, and subsequently traveled through the northern part of Europe. He was made kapellmeister to the King of Sweden in 1776. At Stockholm he founded a second music school and attained much fame by performances on an instrument called the *orchestrion,* a kind of organ invented by him. Louis I., grand duke of Hesse-Darmstadt, appointed him kapellmeister at his court in Darmstadt, in 1807, and paid him a princely salary. While at Darmstadt he opened his third and most famous music school, in which such celebrated musicians as Weber, Gansbacher, and Meyerbeer received instruction. Volger produced a large number of excellent compositions and exercised an extensive influence on the music of Europe.

VOGT (fōgt), **Carl,** naturalist, born in Giessen, Germany, July 5, 1817; died May 6, 1895. After studying chemistry at Giessen under Liebig, he pursued a course in medicine at Bern and afterward received lectures on natural history delivered by Agassiz. In 1847 he became professor of zoölogy at the University of Giessen, but his zeal in the Revolution of 1848 caused him to lose his position, and he was made professor of geology at the University of Geneva. That position he held until his death. Vogt exercised a wide influence in the study of natural sciences and is the author of a number of valuable works. He made an expedition to North Cape in 1861, and was chosen a member of the Swiss national assembly in 1878. His first writing was done in 1839, when he assisted Agassiz in preparing the first two volumes of "Natural History of Fresh-Water Fishes." The independent works of Vogt include "Studies in Geology and Petrifactions," "Physiological Letters," "Ocean and Mid-Ocean," "Essays on the Darwinian Theory," "Lectures on Man," "Descriptive History of the Mammals," "Voyage to Cape North," and "Political Letters to F. Kolb."

VOICE, the sound produced by the vocal organs of a man and nearly all higher vertebrate animals. The larynx is the organ of voice in man. It consists of the expanded upper end of the trachea, or windpipe, and is connected with the hyoid bone or cartilage. An opening, the glottis, connects the larynx with the pharynx. Within the framework of the larynx are two thin, elastic bands, extending from front to rear, called the *vocal cords.* They are not really cords, but merely elastic membranes projecting across the opening. The membranes spread apart and leave a V-shaped orifice when not in use, and through it the air passes to and from the lungs. The edges approach each other when the cords are tightened, thus bringing them within one-hundredth of an inch of each other. When air is expelled or driven out through the glottis or opening between the vocal cords, they are

thrown into vibrations and cause corresponding vibrations in the current of air. It will be seen from this that sound is produced in the same manner as by vibrations of the strings of a violin or the tongues of an accordion, though the vocal cords are scarcely an inch long.

Vocal sound is made only when the cords are less than one-tenth of an inch apart, and the different tones of the voice depend upon the width of the opening and the tension of the cords. When the cords are short, tight, and closely in contact, the higher tones of the voice are produced, while the opposite conditions cause the lower tones. Loudness depends on the strength of the expiratory current, and quality depends chiefly on the physical structure of the cords. The female voice has a higher pitch than that of the male, this being due to the circumstance that the cords of the latter are longer. At about the age of fourteen years the larynx of boys enlarges and the cords grow proportionately longer and coarser; hence, the voice becomes about an octave lower and is said to *change* or *break.* The voice changes somewhat in old age, this being due to the muscles that move the cords losing their elasticity. Soprano, tenor, and baritone voices depend respectively on the length of the cords, but all voices are modified to some extent by the form of the throat, mouth, nose, teeth, and lips. While many animals have voice, man alone has speech, which differs from voice in that it is a modulated form through whose agency ideas are expressed.

Though commonly associated with voice, speech may be effected without the voice, as in whispering, which is speech without the employment of the vocal cords. It is effected principally by the tongue, teeth, and lips modifying the expiratory current. *Lisping, stammering,* and *stuttering* are due more largely to the organs that modify speech than to the vocal cords, especially stammering, which is caused by irregular action of the nerve centers. The faculty of speech is natural, but it may be greatly improved by careful exercise. Vowel and consonant tones make up the two classes of articulate sounds. The vowel sounds are generated in the larynx. They consist of pure vocal tones, modified by the pharynx, mouth, and lips, and attain a nasal quality when the back entrance to the nostrils is not closed. The consonants are formed above the vocal cords, *labials* being made by the lips, *linguals* by the tongue, and *dentals* by pressing the tongue against the teeth. The strength of the voice depends on the resonance of the chest, lungs, and larynx, as well as on the vibration of the vocal cords.

VOLAPÜK (vōl-ä-pük′), an artificial language invented for international use in 1878 by Johann Martin Schleyer, a German priest of Constance, Switzerland. He was a diligent student of philology and was acquainted with fifty different languages. The name Volapük means *world speech* and was compounded from two words in the new language, *vol* meaning world and *pük* meaning speech or discourse. It was the aim of the author to construct a language which would be free from irregularities in grammar, orthography, pronunciation, and syntax, thus making the new language regular and easy to learn.

In Volapük the sounds are represented by 37 letters. To the five pure vowels are added the German *umlauts,* which are placed over a, o, and u, thus ä, ö, and ü. The chief advantage is that the language may be learned in a few weeks. Much progress in the study of Volapük has been made in France, Switzerland, Germany, and in some sections of the United States. The inventor of the language published a grammar and dictionary of it in 1880 and about 2,000 books have been written in that dialect. A number of periodicals are published in it. Many national and international associations have been organized to extend its use. However, more recently it has been displaced to some extent by Esperanto. See **Esperanto.**

VOLCANO (vŏl-kā′nō), a mountain which has an opening and during a period of activity throws out heated matter from the interior of the earth. The opening, which may be either on the top or the side of the mountain, is called the *crater.* Volcanoes are of somewhat different shapes, but the crater is always surrounded by a conical deposit of ejected matter, usually in more or less concentric layers. The ejected matter consists of enormous quantities of volcanic ashes and lava, which are forced from the interior of the earth through a pipe or vent. Three classes of volcanoes have been recognized, including the *active,* the *intermittent,* and the *extinct.* The nature of these is explained by the names given to each. At the beginning of an eruption vast quantities of vapor escape through the crater, which, on cooling, condenses and forms dense clouds and afterward falls in torrents of rain. Large quantities of gases accompany the vapors, usually sulphurous acid gases, and later melted rock or lava and ashes are ejected with great violence.

The lava thrown from volcanoes is generally of a dark color and its texture is hard, but sometimes porous and spongy materials sufficiently light to float on water are ejected in large quantities from the vent. The flow of the lava depends upon its heat and the slope of the mountain side. Frequently it has a forward movement of ten miles per hour, but its velocity lessens as an upper crust forms and retards the rapidity of the flow. Many volcanic islands were formed entirely by lava streams. It is assumed that Iceland and the Hawaiian Islands were produced by lava emitted from numerous volcanic cones. Ashes or cinders are thrown with great violence from the craters of most volcanoes and, when falling directly back to the mountain, aid in rearing the cone. Heavy showers of ashes

are the most destructive of the materials ejected, since they pile up in enormous drifts, as was the case in 79 A. D., when Pompeii and Herculaneum were entirely buried. The ashes are sometimes carried hundreds of miles by the wind, and their fall is frequently accompanied by heavy rains, caused by the ejected vapor of water.

It is not definitely known how many volcanoes exist, but good authorities place the number at 672, of which 270 are active. Of the active volcanoes, 95 are on the coasts of continents and 175 are on islands. Volcanoes form various groups of mountains, or appear as isolated conical elevations. To the latter class belong Vesuvius, Etna, and the peak of Teneriffe. They occur frequently in a continuous line. The most notable volcanic region of America extends from southern Chile to northwestern Alaska, though the active volcanoes are largely in the tropical region, including Popocatepetl, Orizaba, Cotopaxi, Pinchincha, and Jorullo. A line of similar extent passes from the Moluccas, along the eastern part of Asia, through Kamchatka, and by way of the Aleutian Islands into Alaska. This region includes many active cones, especially in the Philippines, of which the volcano Bulusan is a representative. The volcanic region of Europe and Asia is confined largely to the Mediterranean, passing from the Caspian Sea to the Azores, and embracing the Grecian Archipelago and the southern peninsulas of Europe. Isolated volcanic groups occur in divers regions, such as those of Madagascar, the Hawaiian Islands, Iceland, and Mauritius.



VOLCANO BULUSAN, PHILIPPINES.

Many volcanic regions are submerged by the sea, though it is much more difficult to observe their action than that of those located on the land areas. Large volumes of smoke and great flames issued from the Pacific Ocean near Unalaska, an island of the Aleutian group, in 1796, and subsequently a volcanic crater was raised above the level of the water. Sailors visited the region in 1802 and found the surface highly heated. This particular volcano is now several thousand feet in height and has a circumference of three miles. Several instances of the total disappearance of islands are on record. They became submerged through volcanic action, as was the case in Java in 1772, when a mountain totally disappeared. Earthquakes usually accompany volcanic action, and both are attributed to the same cause; namely, the contraction of a cooling crust. It is thought that the materials of the interior are crowded into a smaller space as the heated earth cools and the crust contracts, thus causing the highly heated gases or vapors to exert sufficient pressure to form craters, from which the lava and other materials are thrown.

VOLE, the name of a genus of rodents which belong to the same family as the muskrat and the lemming. The name is not used extensively in America, where similar animals are popularly called *field mice.* Several species of these animals are found in Europe and America. The *field vole,* known locally as the *short-tailed field mouse,* is about the same size as the common mouse, but has a stouter body and the tail is somewhat shorter. Another familiar species is the *water mole,* known in some sections as the *water rat.* It is about the size of the brown rat, has strong hind legs and blackish or dark brown fur, and feeds chiefly on vegetable food. It is called water mole from its living in burrows near streams and lakes. A species known as the *bank mole* has a rusty-colored fur and the tail is quite short.

VOLGA (vŏl′gȧ), the largest river of Europe, which is situated entirely in Russia. It rises in the Valdai Hills and, after a general course of 2,400 miles toward the southeast, enters the Caspian Sea near Astrakhan by seventy mouths. The Volga basin is estimated at 550,000 square miles and includes the heart of European Russia. Among the chief tributaries are the Oka and Kama. On its banks are the thriving cities of Astrakhan, Saratov, Samara, Kazan, Novgorod, Kostroma, Simbirsk, and Tsaritsyn. The Volga is navigable almost its entire distance and is connected by an extensive system of canals with the Baltic, Black, and Polar seas. The basin is a highly productive region. The fisheries include those of the sturgeon and salmon, large quantities of which are exported.

VOLT, the practical unit of electro-motive force, or potential difference, so named from Alessandro Volta, the inventor of the voltaic cell. The pressure is about equal to that produced by the common bluestone cell, usually employed in telegraphy, or a pressure sufficient to cause a flow of one ampere per second against a resistance of one ohm.

VOLTA (vŏl′tȧ), **Alessandro,** natural philosopher, born in Como, Italy, Feb. 18, 1745; died March 5, 1827. He descended from a noble family and received a liberal education. In 1774 he became professor of natural philosophy at Pavia, where he taught successfully until 1804,

when he resigned to devote his attention to various writings on physics. He visited Germany, France, and Holland in 1782 and was called to Paris by Napoleon in 1801, where he received a medal for his discoveries in electricity and was made a member of the French Institute. In 1815 he became director of the philosophical faculty of Padua under the patronage of the Emperor of Austria, but retired in 1819. Volta is the inventor of the electroscope, the electrophorus, and the voltaic pile. The last named is an arrangement for producing electricity by chemical action on plates of dissimilar metals, as zinc and silver, zinc and copper, or zinc and platinum.

VOLTAIC PILE (vŏl-tā′ĭk). See **Galvanic Battery.**

VOLTAIRE (vŏl-târ′), **François Marie Arouet,** eminent author, born in Paris, France, Nov. 21, 1694; died there May 30, 1778. He was the son of François Arouet, an official of France, and was named Voltaire from the estate of his mother. His early education was intrusted to the Jesuits. Afterward he pursued a course in law, but soon abandoned the legal profession for a course in literature. In 1718 he published a tragedy entitled "Oedipe," which was his first highly successful production. Now popular as a writer and speaker, largely because of his wit and brilliancy, he became a favorite in the state society of Paris. At about that time he became known as Voltaire, but his career was temporarily checked by being imprisoned at the Bastile in 1726, owing to having challenged Chevalier Rohan to fight a duel on account of an insult. He was liberated after a few weeks, and at the invitation of Lord Bolingbroke visited England. The visit extended over a period of three years, a sufficient space of time to enable him to become acquainted with English literature and many noted men. George I. had died while Voltaire was in England, and, on the accession of George II., his queen, Caroline, extended marked favors to the writer.



FRANÇOIS VOLTAIRE.

His poem, "Henriade," had been published before returning to France and brought him a fortune, thus enabling him to live quite independent at Paris until 1734, when he took up his residence in Lorraine. There he received distinguished favors from the Marchioness de Châtelet, with whom he resided until her death in 1749, when he accepted an invitation of Frederick the Great to reside at his court in Potsdam, Germany. He remained at the Prussian court for three years, where his reception and early career was one of exceptional brilliancy, but later he became implicated in a series of disagreements and court quarrels. Soon after he retired from the court and took up his residence at Strassburg and Colmar. Subsequently he purchased the estate of Ferney, four miles from Geneva, where he resided about twenty years with his niece, Madame Denis. His life at Ferney was one of notable activity in literature. It was there that many of his fine tragedies and historical works were produced, and his home became noted as a place where the most celebrated men of Europe visited. He maintained an extensive correspondence, which included literary intercourse with many of the noted scholars and princes of Europe, and wrote a number of criticisms, poems, and philosophical treatises.

Louis XIV. having died, he was permitted to return to France, and on Feb. 10, 1778, was received at Paris after an exile of 28 years. His reception was attended by great enthusiasm, not directly from the court, but the distinction shown came from the Academy and all classes of society. Voltaire lived the life of an atheist, opposed fanaticism and superstition, and denounced both priestcraft and Christianity. He completed his famous play, "Irene," after returning to Paris and witnessed its production on the stage, but died before the end of the year. He was buried at the abbey of Scellieres in Champagne, but the remains were removed to the Pantheon in 1791. The complete works of Voltaire have been published in ninety volumes and may be said to cover almost every branch of literature. His most noted historical works include "Louis XIV.," "Charles XII.," and "Peter the Great." Among his tragedies are "Merope," "Zaire," and "Mahomet." His essays include "The Manners and Spirit of Nations" and his philosophical novels, "Candide" and "Zadig."

VOLTMETER (vōlt′mē-tēr), an instrument for measuring electro-motive force. Several instruments of this kind are in general use, but the most common form is a galvanometer arranged so volts may be read directly by means of a pointer and a scale. It has a movable coil mounted on jeweled bearings, and the coil is kept in position by fine spiral springs. In some types the movement of the pointer depends upon the movement of a piece of soft iron on a coil, while in others it is influenced by the movement of one coil with respect to the other. The difference of potential is measured in some voltmeters by the effect of heat upon a long platinum wire, the heat being due to the passage of a current. See **Galvanometer.**

VOLUNTEER (vŏl-ŭn-tēr′), a citizen who enters the military service of his own accord, or who in the time of war offers his service to the country. The name volunteers is applied in

most armies to those men or officers who offer to take part in an assault of peculiar danger, as in an attempt to capture a powerful battery or to storm a fortress. Such enterprise is often called the *forlorn hope* and the survivors usually receive promotion or are specially awarded. The attempts to wrest Jerusalem from the Mohammedans, known as the Crusades, included the largest number and one of the most famous instances of volunteer service for a laudable purpose. In 1794 and in 1803, when 400,000 men were under arms, the British volunteered to repel a threatened invasion of the French. Another notable example may be cited in the large number of volunteers who joined the German armies to accomplish the overthrow of Napolean in 1813-1814 and resumed their occupation after that purpose was consummated. During the Civil War in the United States, from 1861 to 1865, there were 2,656,533 men in the Federal service and the greater number of these were volunteers. Practically all the men added to the service in the United States at the time of the Spanish-American War were volunteers and many thousands volunteered for service in 1917.

VOLUNTEERS OF AMERICA, a religious movement started in 1896 by Ballington Booth, son of William Booth. The promoter of this organization was previous to that time commander in America of the Salvation Army and he and his wife, Maud Ballington Booth, withdrew from the regular organization on account of not approving certain orders promulgated by General Booth. It is organized similar to the general form of organization in the army of the United States and the purpose is to promote religious, charitable, and educational work. In 1908 it had 680 corps, or societies, in the United States, to which country it is chiefly confined. Both indoor and outdoor meetings are held, prisons are visited, destitute are aided by lodging and the obtainment of work, and Christian literature is distributed. A special feature is to enlist the attention of convicts who are released from prison, giving them support until work is found for them.

VOMITING (vŏm'ĭt-ĭng), the act of ejecting some of the contents of the stomach, through its own spasmodic contraction, by way of the mouth. It is usually preceded by a feeling of nausea, a free flow of saliva in the mouth, and frequently by a headache and free perspiration. The immediate cause is a contraction of the abdominal muscles, assisted by the active coöperation of the muscular walls of the stomach, while the diaphragm affords a firm surface against which the stomach is pressed by the abdominal muscles. An overloaded stomach, entrance of poisonous substances into that organ and some diseases and conditions of the body are among the chief causes of vomiting. It frequently accompanies seasickness. Those suffering with this ailment should lie down to rest. Mild stimulants, a small quantity of soda, or an external application of mustard at the pit of the stomach often furnish relief. Some animals, as the lama and the vultures, eject the contents of the stomach as a means of defense against their enemies.

VONNOH, Robert William, portrait painter, born in Hartford, Conn., Sept. 17, 1858. He attended the Boston public schools and the Normal Art School in that city, and subsequently studied under Boulanger and Lefebvre, in Paris. In 1891 he returned to America and devoted much of his time to portrait painting, but also produced a number of valuable figure and landscape paintings. Shortly after his return to America he became instructor in painting at the Pennsylvania Academy of Fine Arts, remaining there until 1896. A number of his productions were on exhibition at the leading expositions of America, including those at Chicago and Saint Louis. His works include "A Poppy Field," "Little Louise," "Sad News," and "Miss Mildred Blair." His wife, Bessie Potter Vonnoh, a sculptor, was born in Saint Louis, Mo., Aug. 17, 1872. She studied at the Chicago Art Institute. In 1904 she was awarded the gold medal at the Louisiana Purchase Exposition, Saint Louis.

VOORHEES (vōr'hĕz), **Daniel Woolsey,** statesman, born in Butler County, Ohio, Sept. 26, 1827; died April 10, 1897. In 1849 he graduated from Asbury University, Indiana, and, after studying law, began a successful practice in 1851. He became United States district attorney for Indiana in 1858, serving in that position for three years. In 1860 he was elected to the United States Congress as a Democrat and was reëlected three times consecutively. He was chosen United States Senator in 1877 and served in that position until his death. Voorhees was an able speaker and writer. He served for many years as a member of the finance committee and was an influential advocate of bimetallism.



DANIEL W. VOORHEES.

VORONEJ (vȧ-rô'nyĕsh), or **Voronezh,** a city of Russia, capital of a government of the same name, about 360 miles south of Moscow. It is situated on the Voronej River, a tributary of the Don, and has railroad connections with the Sea of Azov. The noteworthy buildings include the military school, the post office, two cathedrals, a public gymnasium, and the central railroad station. It has systems of public lighting and waterworks. Among the manufactures are woolen and linen goods, clothing, earthenware, leather, soap, and machinery. It has a large trade in farm produce and sugar. Its ex-

tensive distilleries and tobacco factories are among the largest in Europe. The city was founded in 1586. It was strongly fortified by Peter the Great. Population, 1917, 91,414.

VORTICELLA (vôr-tĭ-sĕl'lȧ), a genus of infusorians found both in fresh and salt water. They are very numerous and many forms are microscopic. The head is bell-shaped and is fixed upon a stem, which is capable of being extended and contracted greatly. Around the mouth, or oral disk, are many long cilia and these are constantly in motion to draw in food. This motion causes a movement of the water at the mouth and is spoken of as the *miniature whirlpool of the vorticella.* Formerly the name was extended to a large group that live in colonies, but these have been separated from the true vorticellas and are now regarded as other genera.

VOSGES (vōzh), a mountain range of Europe. It is situated north of the Jura Mountains and forms a part of the boundary between Germany and France. The range is twenty to fifty miles wide, has valuable forests, and affords fine pasturage. Most of the peaks are rounded and are generally called *ballons.* Ballon de Guebwiller, height 4,688 feet, is the highest peak. The region has valuable deposits of copper, lead, salt rock, silver, and coal. The Moselle, Saar, Saone, Ill, Meurthe, and Lauter rivers rise in the Vosges. A department of France, lying west of the Vosges Mountains, is called Vosges and has an area of 2,270 square miles.

VOSS (fŏs), **Johann Heinrich,** educator and author, born in Sommersdorf, Germany, Feb. 20, 1751; died in Heidelberg, March 26, 1826. After studying in several institutions of higher learning, he became a private tutor, and in 1772 went to Göttingen to engage in editorial work. Later he became rector of the gymnasium in Otterndorf, in Hanover, where he published his celebrated version of the "Odyssey," which has remained the standard translation of that Homeric poem in the German. In 1789 he issued his translation of Virgil's "Georgics," four years later published a version of the "Iliad," and in 1799 completed his edition of the "Aeneid." These works were so ably written that Niebuhr declared that future commentators would be unable to improve them. He discontinued teaching in 1802 and retired to Jena on a pension. Later he removed to Heidelberg, where he was granted a pension of 1,000 florins by the Duke of Baden, and spent the remainder of his life in literary work. His chief writings include "Critical Treatise on Literature," "Letters on Mythology," and the narrative poem "Luise." He made many translations from Horace, Hesiod, Aristophanes, and Theocritus, in 1803 he published a review of Heyne's edition of Homer in the Jena *General Literary Magazine.*

VOSS, Richard, dramatic poet, born in Neugrab, Germany, Sept. 2, 1851. His early life was spent in the agricultural districts and at the outbreak of the Franco-Prussian War, in 1870, he entered the military service as an ambulance nurse. After the close of the war he studied philosophy at Jena and Munich and devoted himself to literature. In 1878 he married and went to Italy, residing alternately near Rome and on his estates in Germany. As a dramatic poet he takes high rank, both in the quality and number of his productions. Among his best known works are "Mother Gertrude," "Regula Brandt," "Tragedy of an Actress," "Modern Romans," "Roman Village Stories," "Michael Cebula," "Savonarola," "Roman Fever," and "Infallibility."

VOTE, a formal expression of the will in regard to some question submitted for decision, as in enacting laws, passing resolutions, or electing officers. Every organized assembly has special rules governing the mode of voting. Most questions of importance are submitted by assemblages to a *roll-call vote,* in which each member responds to his name and states the side of the question that he favors by his vote. Other modes include the *viva voce,* in which the members utter the aye or no in response to the question; the *rising vote,* where the members indicate by standing whether they favor the affirmative or negative side; and the *division,* in which the members voting form different sides to be counted by tellers. Voting at public elections is by a ticket or ballot, on which the candidates' names are printed, and each voter indicates by an arbitrary mark the particular candidates favored, as in the Australian ballot system.

VOTING MACHINE, a mechanism used for automatically recording and counting votes. Devices of this kind have been suggested to prevent repeating and other frauds in elections. The first experiment with a machine of this kind was made in 1892, when certain town officers were elected in New York. The following year several states passed laws permitting the use of voting machines, some at local elections and others at all elections, the adoption to be optional with local boards. It was found that the machines were not only effective in overcoming fraud, but permitted voting with facility and the result was known immediately upon the close of the polls.

Many forms of voting machines have been devised and patented. In the common style of machine it is customary to have a ballot on the plan of the Australian ballot, and the voter who enters the booth may so manipulate a keyboard that the candidates for which he wishes to vote are indicated by a *cross,* or *X,* which appears to the left of the printed name. In addition there are keys for voting *yes* and *no* on amendments or special propositions submitted. Another form is to press a button, after turning an indicator to point to a particular candidate,

when the machine will register the vote, and the mechanism is so constructed that it is locked until turned to the next list of names under a particular office, the arrangement being in alphabetical order.

A device known as the *Standard Voting Machine* was used in many cities of New York in the general election of 1900 and since that time. It is about four feet square and ten inches deep and stands about six feet above the floor, being supported by legs. A bar projects from the upper corners so as to form the support for a curtain that constitutes a booth. The lever is thrown by the voter in such a manner that the curtain closes behind him so as to isolate him from others in the same room. He may elect to vote a straight ticket, in which case he pulls a knob over the party named and directs all the pointers to indicate that ticket. On the other hand, he may vote a mixed ticket by moving the pointer back from over the name that does not suit him and, instead, indicate his preference by moving the pointer to the opposing candidate. Having fully adjusted the pointers to indicate the exact candidates for which he wishes to vote, he operates the lever, thus casting his vote in secrecy and opening the curtain, which has the effect of locking the mechanism and placing it in condition for the next voter.

VOWEL (vou′ĕl), or **Vocal,** an articulated sound which is made with the vocal organs open, hence consists of pure tone only. The vowels in the English alphabet are represented by the five letters *a, e, i, o, u,* and sometimes *w* and *y*. They differ from consonants in that the latter sounds are made by the vocal organs being obstructed in the process of articulation, or are mere emissions of breath articulated by the lips, tongue, teeth, and palate. See **Consonants.**

VULCAN (vŭl′cạn), in Roman legends, the god of fire and of metals. He was the son of Jupiter and Juno, but, being deformed at birth, his mother dropped him into the sea, where he associated with the sea gods for nine years. After returning to Olympus, he became involved in a quarrel between Jupiter and Juno and was banished from the seat of the chief gods to the island of Lemnos. There he became celebrated as a worker of metals by means of fire, and is reputed the maker of a scepter for Jupiter, weapons for Hercules, and the armor borne by Achilles. He failed in winning the favor of Minerva, and became united in marriage to Venus. The worship of Vulcan never became widespread among the Romans, though they retained a temple to his honor at Rome. He ranked among the twelve great gods of Olympus, whose gilded statues were arranged consecutively along the walls of the Forum. He corresponds to the Greek Hephaestus.

VULGATE (vŭl′gāt), the most celebrated translation of the Bible into the Latin language, which, in its revised version, is the accepted standard of the Roman Catholic Church. Saint Jerome had been engaged to correct the *Itala,* an older Latin translation, and while at work formed the plan of making an entirely new version of the Scriptures. He commenced his labor about 383 A. D. and completed the entire work in 405. In the 9th century this translation entirely superseded the Latin version of the 2d century. The Council of Trent, while in its fourth session, on May 27, 1546, declared the Vulgate to be a standard in all sermons, expositions, and public lectures. Pope Clement VIII. made a revision of the Vulgate in 1592-1593, and this work is the basis of the modern Douay version, completed in Douay, France, in 1609.

VULPIUS (fo͝ol′pē-o͝os), **Christian August,** noted author, born in Weimar, Germany, Jan. 23, 1762; died there June 26, 1827. After receiving instruction from private tutors, he studied at the universities of Jena and Erlangen, where he made a specialty of Latin and modern literature. In 1791 he published "The History of Ancient Romance." He was appointed secretary of the court theater at Weimar in 1797, which was at that time under the direction of Goethe. While there he published many operas, dramas, and historical works based on ancient literature. Among his chief works are "Rialdo Rinaldini," a romance, "Ancient Anecdotes," and "Curiosities of Antiquity." His sister, Christina Vulpius (1765-1816), became the wife of Goethe in 1806. He made her the heroine of his "Venetian and Roman Elegies."

VULTURE (vŭl′tûr), any one of a class of birds of prey, being distinguished by a bare head and for the habit of feeding on carrion.

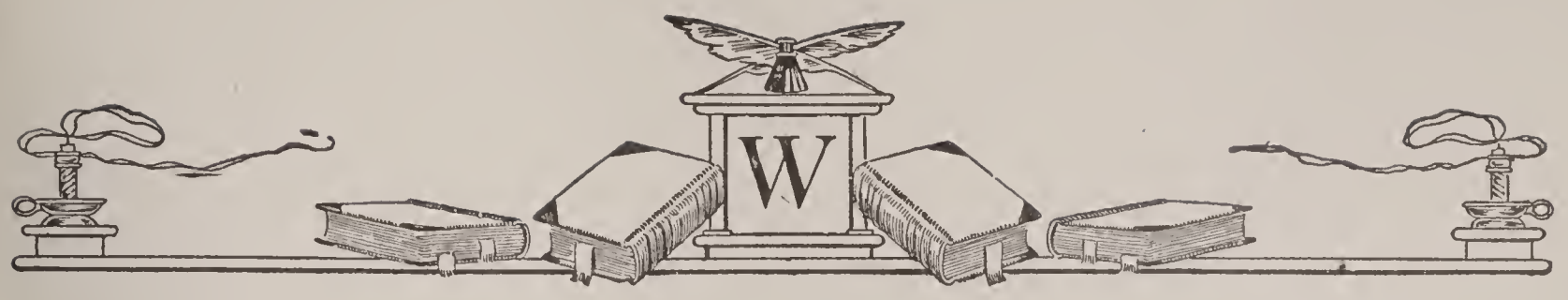


COMMON VULTURE.

These birds are confined largely to the warmer climates, where they are useful as scavengers to consume the carcasses of animals. In all species the neck is strong, the head is quite level on the top, and the flight is elevated. The large size of the feet and strong legs enable them to walk with comparative ease. The head and neck are destitute of feathers, the beak is elongated, and the upper mandible is considerably curved at the end. They differ from most birds of prey in that the female is smaller than the male and

from the eagles in that they do not carry the food to the young, but swallow the carrion and feed the nestlings from their crop. Vultures have an extraordinary development of the senses of sight and smell, thus enabling them to locate carrion with comparative ease at a long distance.

The *turkey buzzard,* a species of vulture widely distributed in the warmer parts of America, is a gregarious bird and collects in flocks, both while flying and in the consumption of food. The body is over two feet long, the color is brownish-black, and the extended wings measure about six feet from tip to tip. An allied species known as the *carrion crow* is abundant in Central and South America. The *California vulture,* found only west of the Rocky Mountains, is the largest bird of prey in North America. Its general color is shining black above, with bands of white on the wings, which measure about ten feet when extended. The head and bare neck are orange-yellow and red. Species native to Eurasia and Africa include the *griffon, Egyptian,* and the *cinereous* vultures. The *lammergeier* of Europe and the great *condor* of South America are noted species.



W, the 23d letter of the English alphabet. It is formed of two V's and has the value of double u. Its use dates from the time when *u* and *v* had not been formed into two separate elementary sounds, one into a vowel and the other into a consonant. The name is *double u* and its oldest form was *uu,* as in *uulfheard.* When used at the end of a word or syllable, it is either silent, as in *row* and *low,* or has the power of a vowel and modifies the preceding vowel, as in *now* and *curlew.* It is silent when initial and followed by *r,* as in *wrong* and *write.* In chemistry, it is the symbol for *tungsten,* from the German *Wolframium.*

WABASH (wą′băsh), a city in Indiana, county seat of Wabash County, on the Wabash River, 42 miles southwest of Fort Wayne. It is on the Wabash and the Cleveland, Cincinnati, Chicago and Saint Louis railroads. The noteworthy buildings include the county courthouse, the public library, the high school, the Masonic Temple, the Memorial Hall, and the Woman's Orphan Home. Among the manufactures are flour, clothing, furniture, earthenware, farming implements, cigars, and machinery. The surrounding country is agricultural and has deposits of natural gas. Gas and electric lighting, waterworks, pavements, and sanitary sewerage are among the improvements. The place was settled in 1837 and chartered as a city in 1866. Population, 1900, 8,618; in 1920, 9,872.

WABASH, a river of the United States, which rises in western Ohio and after a general course toward the southwest joins the Ohio. In the lower course it forms the boundary between Indiana and Illinois. It is navigable about 300 miles. Among the chief tributaries are the Tippecanoe, Embarras, Little Wabash, and White rivers. The total length is 550 miles. It is connected with Lake Erie by the Wabash and Erie Canal. The cities on its banks include Covington, Peru, Lafayette, Wabash, Logansport, Vincennes, and Terre Haute.

WACHT AM RHEIN (vägt äm rīn), **Die,** a famous German patriotic song, known among English speaking people as *The Watch on the Rhine.* The words were written by Max Schneckenburger and the music was composed by Karl Wilhelm. In 1840, when a French army threatened the left bank of the Rhine, the song was written and immediately became popular. Wilhelm's music, which is for men's voices, was first sung in 1854.

WACO (wā′kō), a city of Texas, county seat of McLennan County, 95 miles northeast of Austin, on the Waco and Northern, the Missouri, Kansas and Texas, the Texas Central, and other railroads. It is finely situated at the junction of the Brazos and Bosque rivers. The surrounding country is noted for its extensive production of grain, live stock, cotton, and fruits. Among the principal buildings are the Federal post office, the county courthouse, the public library, the Baylor University, Paul Quinn College, the Add-Ran Christian College, the Douglas-Shuler School, the Waco Natatorium, and the Academy of the Sacred Heart. The streets are substantially paved and improved by gas and electric lighting, waterworks, sewerage, and electric railways. It has manufactures of cotton-seed oil, flour, cotton and woolen goods, clothing, mattresses, canned fruits and vegetables, carriages, farming implements, machinery, and ironware. It is the center of a growing trade in merchandise and farm produce. The place was settled in 1849 and incorporated in 1850. Population, 1900, 20,686; in 1920, 38,500.

WADAI (wä-dī′), a powerful native state of North Central Africa, situated in the Sudan. It is bounded on the north by the Sahara, east by Darfur, south by French Congo, and west by Bagirmi and Lake Tchad. The area is given as 170,000 square miles. Much of the surface is a broken and thickly forested region with a general elevation of 2,000 feet, but the Guere Mountains in the southwest have a height of 3,000 feet. Rainfall is sparse and the water courses dry up during the summer. The soil is fertile, but the northern section is too dry for general farming, though fine grasses are abundant. Cattle, camels, and horses are grown in large numbers. Rice and wheat are the leading cereals. Other products include ostrich feathers, ivory, timber, maize, and fruits.

The inhabitants consist chiefly of Negroes and Arabs. Mohammedan is the religion of the greater number. The slave trade is still per-

mitted, though it has become greatly restricted under European influence. Wadai was founded as a kingdom in 1625, but paid tribute to Bornu and Darfur for many years. Sultan Ali conquered it about 1860, when European explorers began to visit the section. In 1899 the region was placed in the French sphere of influence. Abeshr is the capital and is on several extensive caravan routes. Population, 2,001,500.

WADE, Benjamin Franklin, statesman, born in Springfield, Mass., Oct 27, 1800; died in Jefferson, Ohio, March 2, 1878. He removed with his father to Ashtabula County, Ohio, in 1821, and spent some time as a wood chopper and cattle drover. Subsequently he studied law and, after being admitted to the bar, in 1827, began a successful practice at Jefferson, county seat of Ashtabula County. He was elected county attorney in 1835 and in 1837 became a member of the State senate, serving with one intermission until 1843. In 1847 he became a district judge in Ohio, and in 1851 was elected to the United States Senate, where he served continuously until 1869. Wade was an able opponent of slavery. He served as chairman of the committee on the conduct of the war, and opposed every proposed compromise between the North and the South that did not provide for the abolition of slavery. Subsequent to the war he took a leading part against the reconstruction policy of Andrew Johnson. After the death of President Lincoln, he was chosen president pro tem. of the Senate. In 1871 he served under appointment by President Grant on the San Domingo Commission. Wade was an able orator and debater. He ranks as one of the most influential statesmen of his time and was familiarly called "Old Ben."

WADE, Decius S., jurist, nephew of the former, born in Andover, Ohio, Jan. 23, 1835. He studied at Kingsville Academy and afterward took a course in law. After being admitted to the bar, in 1857, he entered upon a successful law practice, but responded to the call for 75,000 volunteers in 1861. He was chosen first lieutenant of his company and afterward defended Cincinnati against the menaces of Kirby Smith. He served seven years as probate judge of Ashtabula County and in 1869 became State senator. In 1871 he was appointed chief justice of Montana Territory, being the first to hold that position, and served until 1887. Subsequently he was a commissioner to aid in revising the code of that State. He is the author of "Clare Lincoln."

WADSWORTH (wŏdz'wûrth), **James Samuel,** soldier, born in Geneseo, N. Y., Oct. 30, 1807; died May 8, 1864. He studied at Yale and Harvard, and afterward took a course in law in the office of Daniel Webster. After being admitted to the bar, in 1833, he supervised extensive landed interests in western New York, which he had inherited from his father, and gave much attention to the promotion of educational interests. He served as a member of the peace commission in Washington, D. C., in 1861. At the beginning of the Civil War he enlisted in the Union service and attained to the rank of brigadier general. His services were particularly distinguished at Fredericksburg, Gettysburg, and Chancellorsville. When Grant became commander of the army of the Potomac, Wadsworth was assigned a division of that army. He was fatally wounded in the Battle of the Wilderness on May 6, 1864, and died two days after.

WAGER (wā'jẽr), a contract based upon the determination or ascertainment of an uncertain event, under which one of the parties is to make a payment or transfer a valuable consideration to the other. Usually the consideration is placed as a trust in the hands of a third party, who is to deliver it to the one entitled to receive it after the points of uncertainty have been determined. Formerly a wager was valid under the common law, unless it was of a condition that rendered it immoral or opposed to public policy. Now wagers are looked upon in most countries as debts of honor and their payments depend upon the good faith of the parties to the agreement, since they are held to be without a valuable consideration. In most cases it is unlawful to bet or contract a wager in regard to elections.

WAGES, the payment for services rendered, especially the payment of manual laborers receiving a fixed sum for a specified interval of time, as per day, week, or month. Writers generally classify wages as *nominal* and *real.* The former indicates the amount of money received for a certain quantity of labor, while the latter has reference to the quantity of commodities which the money received for the labor will purchase. In the case of a man receiving $1 a day in 1910 and $1.50 for the same work in 1920, it does not necessarily follow that the wages in the latter case were fifty per cent. higher than in the former, though it might or might not be true. It certainly would not be true if the purchasing power of money were twice as great in 1900 as in 1910. Other conditions modifying wages include the demand and supply of laborers, the skill of those offering to do work, and the agreeableness of the employment. The last mentioned condition applies where men have a desire to do particular kinds of work, since they are usually willing to work for less in an occupation that offers the associations and activities to which their desires incline.

It is common to estimate wages high or low according to the amount of money received for the time employed, but writers more correctly base the estimate of wages on the results achieved. Thus a $2 ax may be cheaper than a $1 ax, especially if the work done with it is three times as great as that accomplished by the cheaper one. In the same way, the laborer re-

ceiving the highest pay may, by reason of his superior skill, be the cheaper one for the employer. It is certainly in line with good economy to obtain that class of labor which produces the most at the least expense, rather than to secure the kind that can be had at the lowest price. All efforts to fix wages by law have thus far proven inoperative and harmful. Such an effort was made in England in the reign of Edward III. on the part of capitalists, who resorted to that step by reason of a scarcity of laborers, owing to which fact wages were high. The result was that laborers sought employment elsewhere. On the other hand, if a law were enacted to require wages higher than the natural law of supply and demand would warrant, capital would seek investment elsewhere, thus maturing to the injury of those sought to be benefited. See **Interest; Labor; Rent; Political Economy; Socialism.**

WAGNER (väg′nĕr), **Adolph,** economist, born at Erlangen, Germany, March 25, 1835. He studied jurisprudence at Göttingen and political science at Heidelberg, and in 1858 was made professor of finance and political science at the Commercial Academy at Vienna. Subsequently he held a similar position at the University of Dorpat, was made professor of political science at the University of Freiburg in 1868, and two years later was called to the chair of political science at the University of Berlin. From 1882 to 1885 he was a member of the lower house of Prussia, in which office he took a stand favorable to state ownership of public utilities. His publications, both magazine articles and books, are numerous, especially those devoted to the discussion of social science and the practical problems of economics, which he treated from the standpoint of statistics and jurisprudence. Among his leading works are "Contributions to the Theory of Banking," "Hand-book of Political Economy," and "The Science of Finance."

WAGNER, William Richard, musical composer, born in Leipsic, Germany, May 22, 1813; died in Venice, Italy, Feb. 13, 1883. He entered the Kreuzschule of Dresden in 1822 and in 1828 took up the study of music at Leipsic. His first musical composition was performed in 1833, though he had previously written music under the stimulating influence of Beethoven. In 1834 he was appointed conductor of the opera at Magdeburg, a position rather honorary than profitable. He married Wilhelmina Planer, an actress at Königsberg, in 1836, and soon after became musical conductor at Riga, Russia. In 1839 he made his first visit to Paris, where he made an unsuccessful attempt to introduce his opera entitled "Rienzi." He became conductor of the Royal Opera of Dresden in 1843, and from that time his career was highly successful. He was exiled from Germany in 1848 on account of his enthusiasm for the revolution, and established his residence for ten years in Zurich, where most of his celebrated musical productions were written.



WILLIAM RICHARD WAGNER.

In 1859 Wagner made a visit to Paris and introduced his "Tannhäuser" at the Grand Opera, receiving financial support from the Prince and Princess Metternich, but jealousies caused the venture to become unpopular. He was pardoned for his political offenses in 1861 and soon after settled in Vienna. "The Flying Dutchman" (Der fliegende Holländer), a production based on life in the Netherlands, was successfully presented at Munich in 1864, and a few years later the "Master Singers of Nürnburg" was given with eminent success at the same place. Wagner was now liberally supported by Louis II. of Bavaria, who built a theater especially for the celebrated composer at Baireuth. His last noted production, "Parsifal," based on the legend of the "Holy Grail," was completed at Palermo in 1882. Many of the works of Wagner are popular because they are based on Old German heroic legends and are so written that they blend music, poetry, and dramatic representations into one well-balanced whole. His ability and versatility place him among the most celebrated of modern composers. Among the productions not named above are "Tristan," "Lohengrin," "Siegfried," "The Walküre," "The Isolde," "A Faust Overture," and "The Ring of the Nibelung." He is the author of several books, including "Oper and Rama," "Life of Beethoven," "Knowledge and the Revolution," "A German Musician in Paris," "The Knowledge of the Future," and "Autobiographical Sketches."

WAGON (wăg′ŭn), a vehicle with four wheels, especially such a conveyance used for carrying freight or merchandise. A farm wagon is a representative kind of these vehicles. It has four wheels banded with heavy iron tires, has a long rectangular box to contain the load, and is fitted with a wooden tongue so as to be drawn by two horses. Wagons intended for heavy freighting have heavier wheels and a broader tire than those used commonly on a farm. A *dray* belongs to the wagon type, but differs from it in that it has heavy springs and usually does not carry a box. *Road wagons* are heavy carriages with springs and seats for four persons. Most wagons are fitted with a movable seat mounted upon springs, have an adjustable set of side boards for hauling grain, and are

provided with a movable end gate, or a shovel board.

WAGRAM (vä'grȧm), a village in Austria, on the Russbach River, 20 miles northeast of Vienna. It is important as the scene of a noted battle fought in 1809, between the French under Napoleon and the Austrians under Archduke Charles. Napoleon crossed the Danube on July 5 with 150,000 infantry and 30,000 cavalry and surprised the Austrians, but was repulsed. The next day a second attack followed and the Austrians were defeated, the latter losing 25,000 men. An armistice followed on July 11, and the Peace of Vienna, Oct. 14, 1809, terminated the war.

WAGTAIL (wăg'tāl), the name of a small bird found in Europe, so called from the habit of jerking its tail incessantly. The several species of wagtails run swiftly, have rounded tails, and feed chiefly upon insects and worms. They nest in stony places or among dense herbage. While on the wing, they emit chirping notes and fly by short, undulating courses. The name is given to several species of warblers found in Canada and the United States.

WAHABIS (wä-hä'bēz), a sect of Mohammedans founded about 1750 by Abd-el Waháb, an Arabian reformer. The main tenets of this sect are orthodox and agree with the doctrine of Mohammed, but the purpose is to restore Islam to the simplicity and austerity of its founder. In practice and modes of life these people have been spoken of as the Puritans of Islam. They number about 3,850,000.

WAHPETON (wȧ'pē-tŭn), a city of North Dakota, county seat of Richland County, 45 miles south of Fargo. It is situated on the Red River of the North, opposite Breckenridge, Minn., and on the Great Northern, the Northern Pacific, and the Chicago, Milwaukee and Saint Paul railways. The surrounding country is a rich farming district. It has a large trade in grain and merchandise and has manufactures of flour, machinery, and farming utensils. The chief buildings include those of the county, a college, and a number of parochial schools and churches. It has sewerage, waterworks, and electric lighting. Population, 1920, 3,069.

WAITE (wāt), **Morrison Remich**, jurist and statesman, born at Lyme, Conn., Nov. 29, 1816; died in Washington, D. C., March 23, 1888. His father, Henry M. Waite (1787-1869), was an eminent jurist and provided for the education of his son at Yale, where he graduated in 1837. He was admitted to the bar in 1839 and soon after began the law practice at Maumee City, Ohio. In 1849 he was elected a State legislator and removed to Toledo the following year. He was appointed United States counsel in the Alabama case at Geneva in 1871, served in the constitutional convention of Ohio in 1873, and became chief justice of the United States Supreme Court in 1874. Yale University conferred a degree upon him in 1872, Kenyon College in 1874, and the University of Ohio in 1879. Many important decisions were made by the court while he served on the supreme bench, which included a period of fourteen years.

WAKE, a term frequently used in place of vigil. It is the name of a festival or anniversary celebration that was formerly universal in England. As a festival it was held on the birthday of the saint of a parish church, which was preceded by a night vigil, but the custom finally degenerated into fairs and exhibits. Edward I. forbade holding wakes in country churchyards and Henry VI. prohibited the sale of all articles at the festivals, except those used as food and refreshments. It is still customary in nearly all countries to hold a wake or vigil by the friends and neighbors of a deceased person prior to burial. The custom is thought to have originated from a superstitious notion in respect to the danger of a dead body being carried off by some of the agents of the invisible world.

WAKEFIELD (wāk'fēld), a town of Massachusetts, in Middlesex County, ten miles north of Boston, on the Boston and Maine Railroad. Among the notable features are the Beebe Town Library, the townhall, and the Wakefield Home for Aged Women. It has manufactures of furniture, boots and shoes, stoves, musical instruments, and ironware. Extensive electric street railway facilities, a good water supply, and electric lights are among the improvements. It was settled about 1640, was incorporated as South Reading in 1812, and was chartered under its present name in 1868. Population, 1905, 10,266; in 1920, 13,010.

WAKE-ROBIN, the name of several species of trillium, which is a genus of low, smooth herbs of the lily family. The rootstock is short, the stem is stout, and at the summit of the latter is a whorl of three large net-veined leaves. The solitary flower has three green sepals and three colored petals and is succeeded by a red or purple berry. Several species are widely distributed from Canada to the Gulf of Mexico. *Jack-in-the-pulpit* is a common name applied to several species of this plant, while others are known as *Indian shamrock* and *three-leaved nightshade*. This genus of plants includes the *calla lily*.

WALCHEREN (väl'kĕr-ẹn), an island of the Netherlands, in the province of Zeeland, near the mouth of the Scheldt. It is 12 miles long and has an area of 81 square miles. The surface is low and is protected from overflow by immense dykes and natural downs, but the surface is highly fertile and productive. Agriculture and stock raising are the chief industries. In 1809 it was occupied by a British fleet as a base from which to attack Antwerp, but the expedition proved a failure and a loss of 7,000 men was sustained. Middelburg is the chief town. The island has a population of 42,875.

WALDECK-ROUSSEAU (vål-děk'rōō-sō'), **Pierre Marie Ernest**, statesman, born at Nantes, France, Dec. 2, 1846; died Aug. 10, 1904. After completing his general education, he studied law and in 1879 was elected deputy from Rennes. In 1881 he was chosen minister of the interior under Gambetta and held the same position in the cabinet of Jules Ferry from 1883 until 1885. He was chosen a senator from the department of the Loire in 1894 as a moderate republican, and, after the fall of the cabinet of Dupuy, in 1889, he formed a new ministry, whose members, though differing widely on economic questions, were firmly united upon the position of sustaining the republic against the clericals and royalists. In 1900 he sanctioned reopening the Dreyfus case and gave support to a general amnesty law for all who had been connected with it. He resigned in 1902, after taking a prominent part in gaining success for republican principles in the general election that year. His published works include "Question sociales," "Discours parlementaires," and "La defense républicaine."

WALDENSES (wŏl-dĕn'sēz), a Christian sect founded in Italy by Peter Waldo, an influential merchant of Lyons. He became the leader of a considerable number who looked upon the church and the clergy as corrupt and went forth to preach with the view of bringing about a reformation, though not intending to secede from the established organization. About 1170 he sold his possessions and devoted the proceeds to the Christian cause. The Archbishop of Lyons published a command charging that his followers refrain from further activity, but they appealed to Pope Alexander III., who prohibited their meetings. The reform movement continued and gained strength steadily until in the 16th century, when widespread persecutions followed. Large numbers emigrated to Switzerland and Germany in 1681, where they were given entire freedom of conscience. In 1848 religious liberty was granted to them, and soon after they were given equal political rights with the Roman Catholics in Italy. Their chief seat at present is southwest of Turin, but there are about 20,000 in Germany and Switzerland. The Waldenses hold the Bible as the only rule of faith, but adhere to their confession of belief published in 1855, which they regard the most accurate of biblical interpretations. The latest official returns indicate that the Waldensian Church in Italy has fifty houses of worship, forty mission stations, and sixty pastors. They publish a considerable number of periodicals, tracts, and other literature.

WALDERSEE (väl'dĕr-zā), **Alfred, Count von**, military leader, born in Potsdam, Germany, April 8, 1832; died March 5, 1904. He received a general and military education and in 1850 entered the army. In the Austro-Prussian War of 1866, he rendered distinguished services and also in the Franco-German War of 1870-1871. He was aid-de-camp of the king of Prussia in the latter war and rendered gallant services at the surrender of Sedan and in the siege of Paris. At the close of the war he was promoted to the rank of colonel. He was made quartermaster general in 1882, and in 1888 succeeded Count von Moltke as field marshal in the German army. Emperor William II. promoted him to the rank of field marshal in 1895, owing to his success at the annual maneuvers of the German army near Stettin. He was chosen commander in chief of the allied armies in China in 1900, where he directed the military forces with the approval of the powers. On his return to Germany, in October, 1901, he was decorated by Emperor William II. with the order of *Pour le Merite*. Count von Waldersee married, in 1874, Mary Esther Lee, of New York, the widow of Prince Frederick of Schleswig-Holstein.



COUNT VON WALDERSEE.

WALES (wālz), a principality in Great Britain, lying west of England, which has given the title of Prince of Wales to the heir apparent to the British crown since Edward I. The length is 135 miles; breadth, 25 to 90 miles; and area, 7,446 square miles. The coast line is 362 miles long, being formed on the north by the Irish Sea, south by the Bristol Channel and the estuary of the Severn River, and west by Saint George's Channel. Anglesea Island lies immediately north and is separated from Wales by Menai Strait, and on the western shore are Cardigan and Saint Bride's bays. The surface is largely mountainous and rugged. The Snowden Mountains, in the northern part, are the highest peaks in the southern part of Great Britain, ranging from 2,350 to 3,570 feet above sea level. Most of the drainage is by the Severn and its chief tributary, the Wye, into Bristol Channel. Other rivers of more or less importance include the Tawe, Conway, Taff, and Dee. Lake Bala is the only inland water.

Wales has valuable deposits of minerals, the most extensive being coal, copper, iron, zinc, lead, silver, gold, limestone, and granite. Coal and iron are worked most profitably, and the coal trade is particularly large. The climate, though somewhat cold and damp, is favorable to agriculture and dairy farming. The chief productions include wheat, rye, barley, potatoes, hay, vegetables, and fruits. Manufacturing is

an important industry, the products including cotton and woolen goods, ironware, hosiery, cheese and butter, cured fish, machinery, leather, and farming implements. All the domestic animals common to Europe are reared successfully. Railroad lines extend to all parts of the country. It is divided into twelve counties and has a number of thriving cities. Cardiff, the chief seaport and largest city, is the seat of extensive manufacturing and commercial enterprises. The public schools are well established, and the per cent. of illiteracy is small. Several excellent institutions of higher learning are maintained, including Saint David's College, Saint Beuno's College, and University College.

Wales was invaded by the Romans at the time they occupied Britain, but the inhabitants, being favored by protection in the mountains, long resisted the intruders. These inhabitants were of Celtic origin and were known as Cymri, meaning countrymen or not foreigners. Though the Romans never fully conquered the country, they divided it into districts and called it Cambria. The Anglo-Saxons afterward invaded England, pressing the Britons toward the west, and wars between them and the Celtic tribes were carried on for many years. At that time the Celts came to be called Welsh, an Anglo-Saxon term meaning foreigners, and the country was known as Wales. At first the Welsh were divided into a number of small tribes, but King Roderick the Great united them in the 9th century. Successive advantages were gained by the English, who finally compelled the Welsh to pay tribute to Athelstan and later to Harold. Llewellyn, the last of the Welsh princes, revolted against Edward I., but was slain in a battle against the Earl of Mortimer in 1282. He was succeeded by his brother, David, who assumed the title of Prince of Wales, but was captured in a battle and executed. The country has been incorporated with England since 1284. A final effort for independence was made by the Welsh under Owen Glendower, lasting fifteen years, from 1400 to 1415.

The Welsh are noted for their bravery and generosity. Their language is quite similar to that of the ancient Britons, but it has been greatly improved since the invention of printing. In the alphabet are seven vowels and thirteen simple and seven double consonants, but numerous diphthongs and triphthongs are employed. The Welsh language is spoken exclusively by a large number of the inhabitants, but the larger portion understand and use the English. Many associations have been organized within recent years with the view of cultivating an interest in Welsh literature and promoting the use of the language. This movement, like that recently instituted to maintain the Irish, is meeting with enthusiastic support. The early romances and tales of Welsh literature date from the 8th century, including a collection called the "Mabinogion," and the earliest printed works come from the year 1546. Its literature includes works of importance in history, theology, science, and biography. Population, 1914, 1,722,465.

WALES, Prince of, the title borne by the eldest son of the British sovereign, first conferred on Prince Edward in 1301, who afterward became Edward II. However, the title was not conferred on Edward III., though it has been borne by all the male heirs apparent from the time he conferred it upon his son, Edward the Black Prince. This title is conferred by proclamation or by special creation and investiture. The Prince of Wales, as heir to the crown of Scotland, bears the titles of Prince and High Steward of Scotland, Duke of Rochsay, Earl of Carrick, Baron of Renfrew, and Lord of the Isles. In addition the Prince of Wales, as heir to the crown of Ireland, bears the title of Earl of Dublin. See **Prince of Wales.**

WALFISCH BAY, or **Walfish Bay** (wŏl′fĭsh), a British possession in Africa, situated on the coast of German Southwest Africa, near the Tropic of Capricorn. It has an area of 430 square miles. Besides a small peninsula, it includes a sandy tract on the mainland. The chief productions include fruits and cereals. Horses, cattle, and poultry are raised. It is important for having a good harbor. For the purpose of government it has belonged to Cape Colony since 1878, when it was acquired. Population, 785.

WALHALLA (vål-häl′lå), or **Valhalla,** in Scandinavian legends, the palace in which the souls of those fallen in battle had their habitation, in which they spent their time in joyous feasting. The palace was supposed to be situated in Gladsheim, meaning house of joy, which was surrounded by a grove of golden-leafed trees, and its interior was decorated with the most valuable jewels. It was supposed that the inmates, when aroused by the crowing of the cock in the morning, prepared for a brisk military maneuver, which was carried on relentlessly until noon. At that time all wounds were supposed to be healed and the heroic inmates were permitted to banquet with Odin. They were attended at the feasts by the Walkyries, or battle maidens. Ludwig I. of Bavaria erected a magnificent temple on the Danube, near Ratisbon, in 1832-1842, as a pantheon to the German people. This temple is known as Walhalla, and the idea of its erection was derived from the Walhalla of the ancient Scandinavian deities. It is dedicated to people of all ranks and occupations.

WALKER (wą′kẽr), **Amasa,** political economist, born in Woodstock, Conn., May 4, 1799; died Oct. 29, 1875. After attending college, he engaged in commercial pursuits, and in 1842 became a lecturer on political economy in Oberlin College, Ohio. He was elected a member of the Massachusetts assembly in 1848 and of the senate in 1849, where he secured the passage of a bill placing *Webster's Dictionary* in the common

schools of Massachusetts. He served as Secretary of State from 1851 to 1852 and as a member of Congress from 1862 to 1863. From 1859 to 1869 he delivered lectures on political economy in Amherst College. He was one of the founders of the Free Soil party and became noted as an active worker for temperance. His writings include "Science of Wealth" and "Nature and Uses of Money." He contributed a series of articles to *Hunt's Merchants' Magazine.*

WALKER, Francis Amasa, statesman and statistician, born in Boston, Mass., July 2, 1840; died Jan. 5, 1897. He was a son of Amasa Walker, graduated from Amherst in 1860, and served in the Union army during the Civil War. His eminent services at Chancellorsville won much praise, and in 1865 he was brevetted brigadier general. From 1865 to 1867 he taught Latin and Greek at Williston Seminary, served as United States Indian commissioner in 1872, and was professor of political economy at Yale University from 1873 to 1881. He became president of the Massachusetts Institute of Technology, Boston, in 1881. He attended an international monetary conference at Paris in 1878. Walker is the author of a number of well-known writings and was honored by several foreign associations. His publications include "Trade and Industry," "The Wage Question," "Bimetallism," "The Indian Question," "Political Economy," "History of the Second Army Corps," and "Statistical Atlas of the United States."

WALKER, Frederick, painter, born in London, England, May 24, 1840; died June 4, 1876. He studied at the Royal Academy and under private tutors and took up the work of an illustrator and wood engraver. After 1865 he devoted his time chiefly to works in water colors and paintings in oils. He exercised a wide influence upon art in his native country by producing works of much originality and richness in coloring. Among his chief products are "The Wayfarers," "The Harbor of Refuge," "The Right of Way," "The Bathers," "Philip in Church," and "The Vagrants."

WALKER, Robert James, statesman. born in Northumberland, Pa., July 23, 1801; died in Washington, D. C., Nov. 11, 1869. In 1819 he graduated from the University of Pennsylvania and, after being admitted to the bar, in 1821, removed to Natchez, Miss., to practice the law profession. He was elected to the United States Senate as a Democrat in 1836, which position he held until 1845, when he was appointed by President Polk as Secretary of the Treasury. While serving in that position, he prepared the Walker Tariff Bill of 1846, opposed the Bank of the United States, and advocated the gradual abolition of slavery. He was Secretary of the Treasury from 1845 to 1849. President Buchanan appointed him Governor of the Territory of Kansas in 1857. He was made financial agent of the United States in 1863 and in that capacity visited Europe, where he negotiated $250,000,000 of the 5-20 U. S. bonds. Subsequently he practiced law in Washington, D. C. He contributed a series of articles to the *Continental Monthly.*

WALKER, William, adventurer, born at Nashville, Tenn., May 8, 1824; executed Sept. 12, 1860. He studied at the University of Nashville, where he graduated, and subsequently pursued advanced courses at Edinburgh and Heidelberg. In 1850 he returned to the United States and became an editor and journalist in California. Three years later he organized an expedition to conquer the northwestern part of Mexico, where he undertook to found a republic, and after capturing a number of small towns proclaimed himself president. A strong force of Mexicans was sent against him, but he crossed the boundary and at San Diego surrendered to officials of the United States, by whom he was acquitted on the charge of having violated the neutrality laws. In 1855, taking advantage of a civil war in Nicaragua, he invaded that country and captured Grenada. He formed an alliance with General Corral, the president, who made him the chief military officer. They soon quarreled, but Walker, taking advantage of the unrest in the country, captured Corral and had him convicted and shot for conspiracy. Walker proclaimed himself president, but his arbitrary government caused him to be expelled from Grenada. He surrendered to the United States authorities and was conveyed to New Orleans, but soon after invaded Nicaragua a second time. Again driven from the country, he made an unsuccessful attempt to conquer Honduras, where he was court-martialed and shot at Truxillo.

WALKING STICK, the popular name of several insects found in the warm climates and the warmer part of the Temperate zones. They belong to the leaf insect and very closely resemble the stalks of grass and other plants among which they live. The common walking stick is about three inches long. It has a jointed body and four jointed legs. Those found in the tropics are much larger, frequently nine or ten inches in length. Some of these insects have the form of twigs and leaves, but the majority are cylindrical like a small stick.

WALLACE (wŏl'lăs), a city of Idaho, county seat of Shoshone County, on Placer Creek, 110 miles east of Spokane, Wash. It has transportation facilities by the Northern Pacific Railway and the line of the Oregon Railroad and Navigation Company. The surrounding country produces large quantities of gold, silver, and lead. Lumbering is an important industry in the vicinity of Wallace. The chief buildings include the county courthouse, the public high school, and numerous churches. It has manufactures of lumber products, machinery, spirituous liquors, and utensils. The trade is chiefly

in merchandise, minerals, lumber, and live stock. Population, 1900, 2,265; in 1920, 2,816.

WALLACE, Alfred Russell, naturalist and traveler, born at Usk, England, Jan. 8, 1822; died Nov. 7, 1913. He studied at Hertford and, after taking a course in land surveying, made a voyage to Brazil in 1848 in company with a scientific expedition. After traveling four years, he returned to England and published "Travels on the Amazon and Rio Negro." Soon after he sailed to the Malaysian Islands, where he spent eight years in an exploring tour. He was granted a pension of $1,000 in 1881 and received the Darwin Medal of the Royal Society and a degree from Oxford University. Among his writings not mentioned above are "Tropical Nature," "Island Life," "Australia and New Zealand," "Land Nationalization," "Forty-five Years of Registration Statistics," "Forty Years of Bad Times," and "Miracles and Modern Spiritualism."

WALLACE, Henry Cantwell, public man, born at Rock Island, Ill., May 11, 1866. He studied at the Iowa State College of Agriculture and took up farming and fine stock raising in Adair County, Iowa. In 1887 he became teacher of dairying in the Iowa State College, holding this position until 1891, when he became associate editor of *Wallace's Farmer,* an influential periodical founded by his father, Henry Wallace, of which the son became the editor in 1916. President Harding, in 1921, made him Secretary of Agriculture.

WALLACE, Lewis, soldier and author, born in Brookville, Ind., April 10, 1827; died Feb. 15, 1905. After attaining to a common school education, he studied law and began the practice of his profession at Crawfordsville, Ind. At the beginning of the Mexican War, he volunteered and was made first lieutenant. He practiced law from 1848 to 1861 and in the meantime served a term in the Indiana State Legislature. He was appointed adjutant general of Indiana at the beginning of the Civil War, but soon after became a colonel, and in 1861 defeated the Confederates at Romney, W. Va. Subsequently he took part in the capture of Fort Donelson and the Battle of Shiloh, and aided in defending Cincinnati against Kirby Smith. In 1864 the Confederates defeated him at Monocacy, but he detained the enemy a sufficient length of time to enable Grant to prevent the capture of Washington. Wallace served on the court that tried the assassins of President Lincoln. He was Governor of New Mexico from 1878 to 1881, and minister to Turkey from 1881 to 1885. He is the author of "Ben Hur, a Tale of the Christ," which had a greater sale in America than any romance, except "Uncle Tom's Cabin." Other writings include "The Fair God," a story of the conquest of Mexico, "The Prince of India," "The Boyhood of Christ," and "The Life of Benjamin Harrison."



LEWIS WALLACE.

WALLACE, Sir William, celebrated patriot and soldier of Scotland, born about 1270; executed in London, England, Aug. 23, 1305. It is thought that he was a son of Sir Malcolm Wallace of Ellerslie and that he studied at Dundee, where he probably developed his heroic love for the independence of Scotland by learning the history of the English policy to conquer his country. He is noted for courage, physical strength, and the brave devotion with which he fought against Edward I., King of England, with the view of maintaining the freedom of his native land. He gathered a small band of his countrymen and made several successive attacks on the English, thus causing a number of the Scotch barons to join him. At last the Earl of Surrey, English Governor of Scotland, marched against him with an army of 50,000 men, but Wallace succeeded in defeating the English at Stirling Bridge, on the banks of the Forth, Sept. 10, 1297. He immediately followed up his victory by invading the northern counties of England and, on returning to Scotland, was made guardian of the kingdom. The English gathered an army and invaded Scotland and, being deserted by a number of Scottish nobles, Wallace was defeated at Falkirk on July 22, 1298. He and a number of followers fled to the mountain districts, but a large reward caused him to be betrayed and captured. Wallace was taken to London, where he was given a mock trial and executed as a traitor. His head was exposed on London bridge as a warning to those who opposed King Edward. On the summit of Abbey Craig, near Stirling, is a memorial to Wallace.

WALLACHIA (wŏl-lā′kĭ-ȧ). See **Rumania.**

WALLACK (wŏl′lȧk), **John Lester,** actor, born in New York City, Jan. 1, 1820; died Sept. 6, 1888. He became interested in the stage at an early age, but did not make his appearance at the New York Bowery Theater until in 1847, when he made a success as *Sir Charles Coldstream* in "Used Up." His father, James William Wallack (1794-1864), was a British actor and in 1861 established the Wallack Theater in New York City, of which the son became proprietor in 1864. He conducted that theater for 24 years. He wrote a number of pieces for the stage, including "Rosedale" and "The Veteran." *Scribner's Monthly* published a series of articles written by him.

WALLA WALLA (wŏl′lȧ wŏl′lȧ), a city in Washington, county seat of Walla Walla County, 242 miles northeast of Portland, Ore. It is situated on the Walla Walla River, has communication by the Northern Pacific and the line of the Oregon Railroad and Navigation Company, and is the shipping point of large quantities of live stock, grain, vegetables, and fruits. The site has an altitude of 1,050 feet and is surrounded by a fertile section of farming land. It is the seat of Whitman College, the State penitentiary, the De La Salle Institute, the Saint Vincent's Academy, the Saint Paul's Episcopal School, and the Walla Walla College. Other features include the county courthouse, the public library, the high school, the Odd Fellows' Home, the Saint Mary's Hospital, and the Stubblefield Home for Widows and Orphans.

Walla Walla has extensive commercial and industrial interests. Among the manufactures are hardware, cigars, clothing, furniture, machinery, earthenware, flour, and cheese. It has gas and electric lighting, sanitary sewerage, public waterworks, and electric street railways. A military post was established here in 1856, when it was called Steptoe City, but it was incorporated under the present name in 1868. Population, 1900, 10,049; in 1920, 15,503.

WALLENSTEIN (wŏl′ẹn-stīn), **Albrecht Wenzel Eusebius von**, eminent German soldier, born in Hermanitz, Bohemia, Sept. 14, 1583; assassinated at Eger, Feb. 25, 1634. His father and mother were members of the Bohemian Evangelical Church, but both died while he was yet young, and he was sent to the Jesuit College at Olmütz. While there he embraced the Roman Catholic faith. Subsequently he studied at Altdorf, Bologna, and Padua, and afterward visited many parts of France, Germany, and the Netherlands. Later he joined the imperial army for service in Hungary against the Turks, and at the close of the war, in 1606, married a widow of noble rank. She died in 1614, leaving him a vast fortune, and he soon after received the title of count and the military rank of colonel. When the insurrection broke out in Bohemia, he firmly adhered to the imperial side, and at the cessation of hostilities purchased a number of estates which he erected into the state of Friedland. Soon after Ferdinand II., who felt impelled to recompense the valuable service of Wallenstein, made him a prince of the empire and conferred upon him the title of duke of Friedland. He raised an army of 30,000 men in 1626 to aid Emperor Ferdinand and soon after allied his forces with Tilly, the famous German military leader, against Christian IV. of Denmark and General Mansfield. Tilly defeated Christian IV. at Lutter and Wallenstein overcame the forces of Mansfield at the bridge of Dessau, thus compelling Christian IV. to agree to a treaty of peace in 1629.

Though an efficient military leader, Wallenstein had many enemies among the nobles and the people; the former were jealous of his successes and the latter felt outraged by the vast destruction of property by his army. Ferdinand finally dismissed him from the service in 1630 and he retired to Gitschin, capital of his duchy of Friedland. However, when Gustavus Adolphus invaded Germany, he was promptly recalled to the service. An army of 40,000 men was placed at his disposal, with which he expelled the Saxons from Bohemia and laid waste a large portion of that country. Sweeping northward to expel the invading Swedes, he fought the battles of Nuremberg and Lützen, but in the latter he was entirely defeated, though Gustavus Adolphus was among the slain. Wallenstein failed to make use of the temporary advantage following the death of the Swedish leader, largely because he was planning to make himself sovereign of Bohemia. This scheme was soon after discovered and an order was issued from Prague in which he was charged with treason. He took refuge with a small band of adherents at Eger, where he was afterward assassinated by several dragoons. Wallenstein ranks as one of the most famous military leaders employed by the Catholic League and its supporters in the Thirty Years' War, though that organization, under the leadership of the Duke of Bavaria, became his adversary. He was ardent in his opposition to Protestants, but is generally credited with greater liberality and religious tolerance than Ferdinand II.

WALLER (wŏl′lẽr), **Edmund**, poet, born at Coleshill, England, March 3, 1606; died Oct. 21, 1687. He descended from an ancient and wealthy family, studied at the University of Cambridge, and obtained a seat in Parliament at the early age of eighteen years. At first he was opposed to the Royalists, but was won over by them and entered what is known as the Waller's Plot to restore royal authority. This plot was discovered and he confessed, but escaped by a heavy fine and banishment, while a number of his companions were hanged. In 1653 he was permitted to return, when he became a close friend of Cromwell. The remainder of his life was spent largely in literary work, but he again entered Parliament in 1661. His poems are noted for correct versification and his works are written with the smoothness of those of Pope and Dryden. The two poems by which he is best known are "On a Girdle" and "Go, Lovely Rose."

WALLINGFORD (wŏl′lĭng-fẽrd), a borough of Connecticut, in New Haven County, twelve miles northeast of New Haven, on the Quinnipiac River and the New York, New Haven and Hartford Railroad. It is the center of a growing trade in merchandise and general manufactures. The streets are well platted and improved, being generally graded and paved,

and it has electric railway connection with the leading cities of the State. Among the manufactures are brassware, furniture, machinery, hardware, tools, rubber goods, clothing, and silver-plated ware. It has electric lighting, sanitary sewerage, waterworks, and several fine schools. The borough was incorporated in 1670 and near it was established, in 1851, the Wallingford Community, a society similar to the Oneida Community. At present the State Masonic Home occupies the community property. Population, 1900, 6,737; in 1920, 9,648.

WALLOONS (wŏl-lo͞onz′), a class of people occupying the southeastern part of Belgium, especially the provinces of Liége, Arlon, and Namur. They are descendents of the Gallic Belgae and were sheltered from the German conquerors by taking refuge in the Ardennes Mountains. Ultimately their language became mixed with the French, but it still retains the greater part of the Gallic. They may be said to resemble the French more closely than the German, though they surpass the former in business activity and earnestness. Their number is steadily increasing, a fact giving rise to political contests between them and the Flemish. Many of the eminent statesmen of Belgium are to be traced to Walloon ancestry. The Walloon inhabitants of Belgium and France are placed at 2,783,280.

WALL PAPER. See **Paper Hangings.**

WALNUT (wŏl-nŭt), an extensive genus of valuable and beautiful trees, which are prized for their wood and for the edible nut borne by most of the species. Thirty species have been catalogued, the larger number of which are native to America. The *black walnut* is the most valuable species found in Canada and the United States, although the nuts are inferior for the market to those of the Persian, or English, walnut, but they are richer and juicier. The wood is hard and durable, has a reddish-black color, and is of much value in the manufacture of furniture and musical instruments. Black walnut trees attain a diameter of three to six feet and a height of 40 to 75 feet. The nut matures about the first of October. It is surrounded by a thick, greenish husk, which turns black when dried. The oily kernel is inclosed in a hard shell and is used in making walnut oil, in culinary arts, and for eating. Another widely distributed species is the *white walnut,* or *butternut,* which yields a nut somewhat less flavored, and its wood is not as valuable and durable as that of the black walnut. The common walnut of Europe and Asia is a fine, spreading tree and produces excellent wood and edible nuts. These nuts are gathered in the fall and transported in large quantities. They yield the products called walnut oil and nut oil, which are used as articles of diet and by painters. In some countries the walnut oil is burned in lamps and used for the finer printing inks. The wood is of value in making gunstocks and furniture and for construction purposes.

WALPOLE (wŏl′pōl), **Horace,** author, born in London, England, Oct. 5, 1717; died March 2, 1797. He was the youngest child of Sir Robert Walpole, studied at Eton and Cambridge, and in 1739 went on an extended tour of continental Europe. In 1741 he was elected to Parliament, where he held a seat until 1768, though his political carecr is not distinguished by brilliance or activity. He had secured an estate from his father valued at $25,000 per year and in 1746 purchased the villa of Strawberry Hill, a beautiful home overlooking the Thames, at Twickenham, near London. This he adorned with paintings and enriched his library with all the books and manuscripts that his literary taste craved. He succeeded to the peerage in 1791, with the title of Earl of Orford, but never took his seat in the House of Lords. His writings are very numerous, though his fame rests upon his "Letters," the result of extended correspondence with public men. They so closely touch the events of his time that they may be regarded a fine addition to English literature. Other writings include "The Castle of Otranto," "Memoirs of the Reign of King George III," "The Last Ten Years of the Reign of George II.," "Catalogue of Noted Engravers," "Mysterious Mother," "Catalogue of Royal and Noble Authors," and "Historic Doubts on the Life and Reign of Richard III."

WALPOLE, Sir Robert, Earl of Oxford, statesman, born at Houghton, England, Aug. 26, 1676; died March 18, 1745. He studied at Eton and Cambridge and in 1701 entered Parliament. In 1707 he was made Secretary of War and in 1709 became Treasurer of the Navy. His ability and zeal were alike noted, but his desire to overcome political opponents caused him to be charged with corruption, and in 1712 he was expelled from the house and committed to the Tower. He became privy counselor when George I. ascended the throne, and afterward was made First Lord of the Treasury. Walpole was noted as an influential member of the Whig party and his powers were exercised to establish the Hanoverian succession. His support of the German party caused such opposition among his political opponents that he was compelled to resign in 1717, but he was recalled to office in 1721, and from that time until 1742 was the Prime Minister of England. He resigned in 1742 and was made Earl of Orford, with a pension of $20,000 per year. Shortly after charges of corruption were brought against him, but the proceedings were dropped for want of evidence. Walpole exercised an influence for good, chiefly by promoting a policy leading to the commercial development of Great Britain, and relieved taxation by wholesome reforms in the tariff laws.

WALPURGIS (väl-po͞or′gĕs), or **Walpurga,** the name applied in Germany to the eve of

May 1, when, according to legends, the witches were supposed to assemble at some appointed rendezvous, such as the highest point of the Hartz Mountains. The legends of Walpurgis Night had their origin in the 8th century, when Saint Walpurgis established convents and several societies in that country. The reason that May 1 was named as the day to commemorate her is that a heathen festival was formerly held at that time and her feast was appointed to take its place, though it properly should be held on Feb. 25.

WALRUS (wŏl′rŭs), **Morse,** or **Sea Horse,** an animal resembling the large seals, but it has dental affinities with the ungulates. The skull is large and the facial portion is quite long. The hind limbs are flexible, serving to propel the animal in moving in the water, and tusk-like canines extend from the upper jaw. It has no external ears, but the sense of hearing is quite well developed. The eyes are small, the body is large and sacklike, and the fur is principally of a tawny-brown color. Its hide is so



WALRUS.

tough that bullets penetrate it with difficulty. The fore paws are webbed, having a horny protective covering, and are two or three feet long. Walruses are carnivorous mammals, feeding on bivalve mollusks, which they obtain by digging with their tusks. They are usually found near the coast on floating ice. The males reach 12 to 20 feet in length and weigh from one to two tons, but the females are somewhat smaller. The blubber yields excellent oil and the skin is of value in making a durable leather, used largely in manufacturing machine belts. A hard, white ivory is obtained from the tusks, which weigh three to six pounds. The walrus is gregarious and inoffensive, but becomes desperately aggressive when attacked. These animals are native to the arctic regions of both hemispheres, where they are hunted for their skins and blubber. The Eskimos value their flesh for food. Siberia, the Aleutian Islands, Baffin Bay, and Spitzbergen have valuable walrus fisheries.

WALSALL (wŏl′sąl), a city of England, in Staffordshire, seven miles northwest of Birmingham. It has canal and railway connections with other trade centers. The surrounding country contains valuable deposits of coal, iron, and limestone. It has public baths, electric street railways, sanitary sewerage, a municipal library, and many fine schools and churches. Among the manufactures are ironware, clothing, flour, bolts, locks, carriages, and machinery. The principal streets are regularly platted, but those in the older part are crooked and illy improved. Ethelfleda, daughter of Alfred the Great, fortified Walsall, and it subsequently passed to William the Conqueror and to the Duke of Northumberland. Though long a manufacturing city, its prosperity dates from the time railroads were built to connect it with other trade centers. Population, 1921, 92,130.

WALSINGHAM (wŏl′sĭng-ăm), **Sir Francis,** statesman, born in Chiselhurst, England, in 1536; died April 6, 1590. He first studied under private tutors. Later he entered the University of Cambridge, but left that institution before graduating to make an extensive tour of Europe. Queen Elizabeth sent him on several important missions to France, in which he negotiated terms for the toleration of the Huguenots. In 1573 he was made one of the secretaries of state to Elizabeth. He was sent on an important embassy to the Netherlands in 1578 and to Scotland in 1583. While serving in the latter capacity he obtained possession of some of the letters written by adherents of Mary, Queen of Scots, and by them became enabled to discover the Babington conspiracy to murder Queen Elizabeth. Friends of Queen Mary charged Walsingham with being an accomplice in bringing her to the block on forged evidence, but this charge was not proven, though it is known that he regarded her execution of interest in furthering the scheme to make Scotland permanently subject to England. He had become surety for the debts of Sir Philip Sydney, whereby he became so heavily involved that he died in extreme poverty, and his friends buried the remains in Saint Paul's at night to save the expenses incurred by a public funeral. His writings were published under the title, "The Complete Ambassador."

WALTER (wąl′tẽr), **Thomas Ustick,** architect, born in Philadelphia, Pa., Sept. 4, 1804; died there Oct. 30, 1887. He studied architecture in the office of William Strickland, architect of the mint and customhouse of Philadelphia. In

1847 he completed the main building of Girard College, which is thought to be the finest specimen of classic architecture in America. The government employed him in 1851 to design an extension of the capitol at Washington and later to make additions to the treasury, the patent office, the post office, and the congressional library buildings. Another important work by Walter is a breakwater constructed for the government of Venezuela at Laguayra. He was a member of the American Philosophical Society and of the Franklin Institute and president of the American Institute of Architects. Harvard University conferred a degree upon him in 1857.

WALTHAM (wŏl'thăm), a city of Massachusetts, in Middlesex County, on the Charles River, ten miles west of Boston. It is on the Boston and Maine Railroad, has electric railway facilities, and is the seat of a Swedenborgian theological seminary. Among the noteworthy buildings are the public library, the Waltham Hospital, the Notre Dame Normal School, the Leland Home for Aged Women, and the Massachusetts School for the Feeble-Minded. Prospect Hill Park is a fine public resort. The manufactures include cotton and woolen goods, hosiery, watches, furniture, boots and shoes, clothing, and machinery. Waltham has many excellent residences and is the seat of a large trade. It is particularly noted for the manufacture of the Waltham watches. The place was chartered as a city in 1884. Population, 1905, 26,239; in 1920, 30,691.

WALTHER (väl'tĕr), **Carl Ferdinand Wilhelm**, theologian and author, born in Langenchursdorf, in Saxony, Germany, Oct. 25, 1811; died in Saint Louis, Mo., May 7, 1887. His father, Gottlieb Heinrich Wilhelm Walther, was a Lutheran clergyman. He received a classical education in the gymnasium at Schneeberg and afterward studied theology in the University of Leipsic, from which he graduated in 1833 with high credits. After teaching as tutor in a family at Kahla, he became pastor at Bräunsdorf, where he officiated successfully for some time. In 1838 he left Germany to seek a wider field of labor among the Lutherans of America, landing in New Orleans, La., in the early part of 1839. His first pastoral charge in America was at Altenburg, Perry County, Missouri, but in 1841 he accepted a call to a pastorate in Saint Louis, where he spent nearly a half century in fruitful Christian work.

Walther was so successful by reason of his able pulpit oratory and devotion to his work that he was enabled to dedicate the Holy Trinity Church of Saint Louis in 1842, and soon became recognized as an eminent Lutheran divine. In 1847 he was a leader in organizing the synod of Missouri, Ohio, and other states, of which he was chosen the first president. This synod is now the largest Lutheran organization in America. In 1849 he was elected president of the Saint Louis Theological Seminary, which position he filled with eminent success until his death. The synodical conference of the Evangelical Lutheran Church of North America was organized with his active coöperation in 1872, and its work was stimulated and extended by his devoted labors. He was not only a fine classical scholar and profound theologian, but possessed a high degree of efficiency as an organizer and author. His most noted publication, "The Annotated Edition of John William Baier's Positive Theology," was issued at Saint Louis in 1879 and is counted among the most thoughtful and scholarly works in Latin written in America. Many of his sermons were published in German and English and had a wide circulation in America and Europe. Among his published works are "The Evangelical Lutheran Postil," "Speeches and Sermons," "The Voice of Our Church," "Talks and Prayers," "The Rightful Distinctions Between the Law and the Gospels," "Lutheran Epistle-Postil," "Gospels and Epistles," "Luther's Little Catechism," "Mercy-Year," and "Festival Tones." He founded *Der Lutheraner,* in 1844; the *Lehre und Wehre,* in 1854; and the *Homiletisches Magazin.* The first mentioned periodical was under his direct editorial charge for 43 years.

WALTHER VON DER VOGELWEIDE (väl'tĕr fŏn dĕr fō'gĕl-vī-dĕ), meaning Walter of the Bird-Meadow, famous singer, born in Tyrol, Austria, about 1168; died in Würzburg, Germany, about 1228. He descended from noble parentage, but his musical inclinations induced him to become a minstrel singer, and he may justly be classed as the greatest and most famous of the Minnesingers (q. v.). Duke Frederick of Austria employed him at his court for several years and after the death of the latter, in 1198, he visited the courts of many sovereigns of Germany, but later was retained at the court of Emperor Philip. In 1217 he was engaged at the court of Duke Leopold of Austria, with whom he remained most of the time until 1220, when he accepted an invitation to join the retinue of Englevert of Cologne. He settled at Würzburg, in 1224, where he lived in retirement until his death. Walther is the author of many excellent poems. The earlier writings consist largely of songs devoted to love and fancy, but his later productions deal with the political life of Germany and the events relating to the Crusades. Interest in his writings has been revived by many modern writers.

WALTON (wạl'tŭn), **Izaak**, author, born in Stafford, England, Aug. 9, 1593; died in Winchester, Dec. 15, 1683. He passed his early manhood in London, where he engaged in the business of a linen draper. In 1643 he retired from trade with a competence for his modest desires and lived in ease to the advanced age of ninety years. He spent much time in travel and literary study and made it a point to hold a large acquaintance with clergymen. His fame

as a writer rests principally on the work entitled "The Complete Angler," a treatise on his favorite pastime of fishing. The production is in the form of dialogues carried on by a hunter, a falconer, and an angler, in which each extols the delights of his favorite sport, until the angler vanquishes the others by his eloquence and makes them his disciples. The angler next initiates the disciples into the mysteries of the gentle craft by giving racy descriptions of the fortunes of angling days. This work went through five editions in the time of Walton. It is still a popular production among English readers. Other writings include lives of distinguished contemporaries. Among them are those of Richard Hooker (1665), George Herbert (1670), and Robert Sanderson (1678). These biographies are written with a tender grace, and are all considered masterpieces. He aided John Chalkhill in writing "Thealma and Clearchus."

WALTZ (wȧlts), a dance of German origin, so named from the word *walzen,* meaning to roll. It is danced by two persons placed directly opposite and almost embracing each other, who turn round on an axis of their own, while moving in a circle, the radius of which varies with the dimensions of the room. The music is written to three-fourths time. Any number of couples may join the circle in moving round the room, or it may be danced by only one or two couples. Johann Strauss is the most famous writer of waltz music, but some of the classical masters produced compositions that are suitable but not intended for this dance. Waltzing became very popular at the beginning of the 19th century and was long the only form of round dance in vogue, but it has been supplemented by the polka, schottisch, cotillion, and two-step.

WAMPANOAG (wŏm-pȧ-nō′ȧg), a tribe of Algonquin Indians, who occupied the region included in Massachusetts and Rhode Island. They are sometimes called Pokanoket from their principal village. A large number were killed during King Philip's War and many of the survivors fled to Canada. Those who survived were either sold into slavery or remained near Compton, R. I., but they became extinct before the beginning of the 19th century.

WALWORTH (wŏl′wûrth), **Reuben Hyde,** jurist, born in Bozrah, Conn., Oct. 26, 1788; died in Saratoga, N. Y., Nov. 27, 1867. In 1809 he attained admission to the bar and shortly after began the practice of law at Plattsburg, N. Y. He served in Congress from 1821 to 1823, as circuit judge from 1823 to 1828, and as chancellor of the State of New York from 1828 to 1848. Walworth may be classed with the most eminent jurists of America, especially as an exponent of equity jurisprudence. He wrote "Rules and Orders of the Court of Chancery of the State of New York" and in 1864 published the "Hyde Genealogy," a work in two volumes. Princeton granted him the degree of law in 1835.

WAMPUM (wŏm′pŭm), the name of beads formed from the interior parts of shells. Formerly they were strung on threads and used among the American Indians as money, or were worn in necklaces, belts, bracelets, and other articles of ornament. According to tradition, wampum was first employed as money by the Narragansett Indians and afterward was generally adopted by the natives along the eastern coast as a medium of exchange. The colonists of New England and the Middle States adopted wampum as money, where it ranked as a legal tender from 1627 to 1661. Periwinkle shells, found largely along the Atlantic coast, were employed in making wampum. The inner part of the shell was made round and smooth by rubbing on a stone, and afterward holes were drilled for stringing the rounded pieces. Wampum made from black beads was called *suckanhock,* while those made from white beads were called *wampumpeag.* The former had twice the value of the latter in exchange. In many instances the beads were strung together and sewn upon belts. When making payments in wampum, individual beads were stripped off, or portions of the embroidered belts were used. These belts entered as an essential element into peace treaties and agreements.

WANAMAKER (wŏn′ȧ-mā-kẽr), **John,** merchant, born in Philadelphia, Pa., July 11, 1837. He attended the public schools of his native city and in 1861 established a mercantile business. His care and diligence in buying and selling made him highly successful. In 1876 he became head of the firm of John Wanamaker & Co., which conducted an immense clothing, dry goods, and miscellaneous business. He founded the Bethany Presbyterian Church, was for many years president of the Philadelphia Young Men's Christian Association, and made many subscriptions to aid benevolent enterprises, such as relieving yellow fever sufferers in the South and famine-stricken peasants in Ireland. President Harrison appointed him Postmaster-General in 1889. During the four years of his service the postal business was managed with much executive ability. He introduced the profit-sharing system into his commercial business, which plan proved highly successful under his management.

WANDERING JEW (wŏn′dẽr-ĭng jū), a name used as the subject of several legends, the character being represented as a Jew who is condemned to wander from place to place until the day of judgment. Three noteworthy legends are included in the list. The one is that of Matthew Paris, who represents him as the doorkeeper of the judgment hall, in the service of Pontius Pilate. It is related that he scorned our Lord as He was led forth, saying "Get on faster, Jesus," but the latter replied, "I am going, but thou shalt tarry till I come again." In another

legend he is represented as a carpenter making the cross for Christ, and, when the latter was pressed down with the weight of His cross, the Jew is said to have urged Him to proceed, but Jesus replied, "Truly I go away, and that quickly, but tarry thou till I come." Another legend is that the Jew was a shoemaker at his bench and refused the Savior permission to rest on his accustomed seat. In each case the subject of the legend is represented as wandering from place to place, laden with cares and tribulations, but in vain seeking death. Some of the finest illustrations by Doré are based upon the Wandering Jew. This legend was made the subject of an interesting novel by Eugene Sue. It also forms the basis of other novels and of many poems.

WAPAKONETA, capital of Anglaize County, Ohio, 85 miles south of Toledo, on the Anglaize River and on the Toledo and Ohio Central and other railroads. It has a shipping trade in cereals, petroleum, and live stock. The manufactures include furniture and machinery. It was settled in 1833 and incorporated in 1845. Population, 1920, 5,295.

WAPITI (wăp'ĭ-tĭ), a species of large deer found in North America. It is closely allied to the red deer of Europe, but is considerably larger, weighing from 800 to 1,000 pounds and measuring five feet in height at the shoulders. The wapiti is commonly called *elk* in America, but it differs from the moose. See **Elk.**

WAR, an armed contest between nations or states, or between different parties in the same state. In the former case the contest is termed *international war* and is under warrant and by authority of the sovereign power of each belligerent; in the latter case it is termed *civil war. Aggressive,* or *offensive,* war is a contest which is prosecuted in the territory of the antagonist, while *defensive* war is an armed resistance to an attack. Wars take place principally as means of common defense, for avenging insults and redressing wrongs, to obtain and establish the superiority and dominion of one contestant over the other, and for the extension of commerce and the acquisition of territory. Savage nations wage war largely for purposes of plunder. The usual plan of conducting warfare is by the slaughter or capture of the troops and the seizure or destruction of ships, property, and towns.

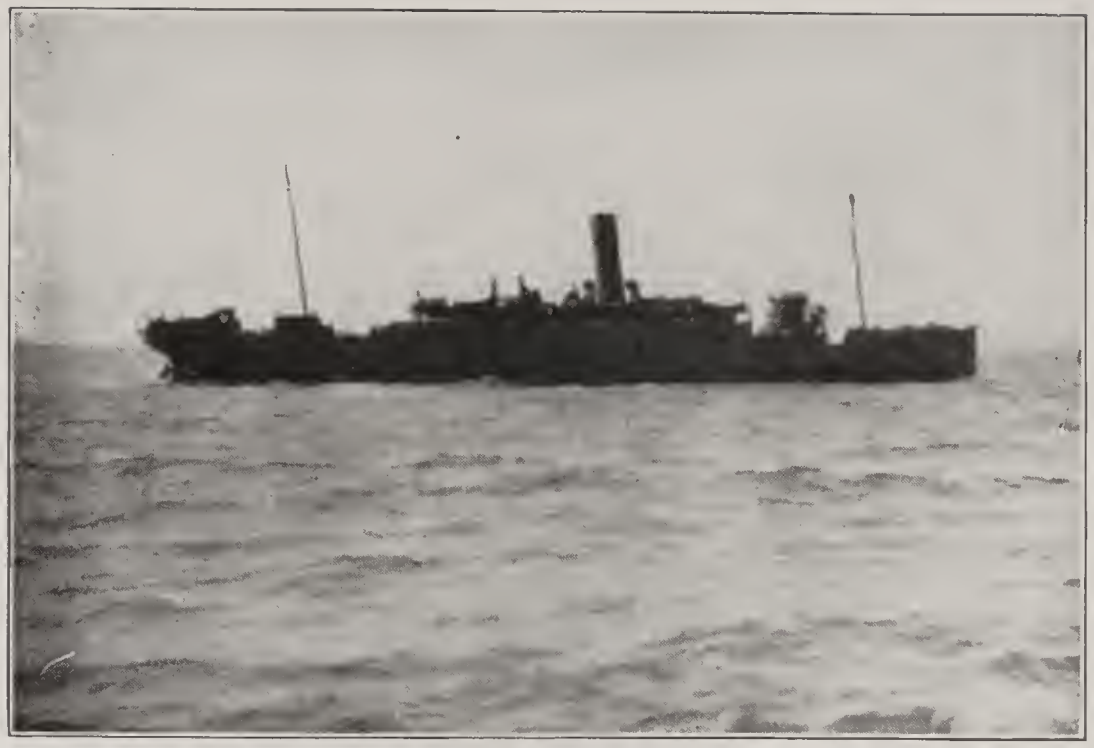
Wars by savage nations and despots begin by an invasion of territory belonging to others, the incursion being without formal notice, but civilized nations take steps to secure a settlement of difficulties without employing armed force, and, when peaceable means fail, a formal *notice,* or *declaration, of war* is sent. Nations have come to recognize certain usages, laws, and rights of war during the progress of the contest, these applying both to the belligerent and neutral powers. Wars are as old as human history and those of ancient times and savage nations are particularly repulsive for the great cruelties committed. Most civilized nations have come to look upon opposing parties as enemies only so long as they actively bear arms, and when peace is attained relations of friendship and commerce are reëstablished. The possibility of war is no doubt lessened by a constant readiness of the nations to conduct extensive contests, a fact accounting largely for the vast standing armies and the thorough equipments in the form of forts, battleships, and implements of war maintained by the great powers of Europe. The ambition of statesmen of the present century is and ought to be to secure equitable and stable government without encumbering the people with heavy taxes for the maintenance of extensive equipments. See **Battle; Neutrality.**

WAR, Department of. See **United States, Departments of the.**

WAR, The Great European. See page 666, Volume II, Practical Home and School Methods.

WARBECK (wạr'bĕk), **Perkin,** British pretender, born at Tournay, England, in 1474; executed Nov. 23, 1499. He is reputed to have been the son of a Jew who lived at Tournay. In 1490 he appeared at the court of Burgundy, where he impressed all who met him with his extraordinary resemblance to Edward IV. While there he was instructed by tutors to represent Richard, Duke of York, the younger of the two princes who are supposed to have been murdered in the Tower in 1483. The opponent of Henry VII. supported him and he received encouragement from the foreign powers which were hostile to England. In 1497 he made an expedition into England and was captured and confined in the Tower, where he was allowed considerable liberty, but afterward entered a conspiracy against the government and was executed.

WARBLERS (wạr'blẽrz), the name applied to a family of perching birds, most of which are shy, small, and active. They have a clear and beautiful song. The common birds of this family include the *redbreast, hedge sparrow, redstart, nightingale, bluebird, sedge warbler,* and *reed warbler.* Most warblers are migratory and are widely distributed in all climes. They are valuable because of their activity in catching large numbers of insects, which form their chief food. The *wagtail* is a notable species of the warbler family and is so called from the habit of wagging the tail, when it is on the ground. It is seen mostly in pastures and meadow lands and includes several species, such as the gray wagtail, yellow wagtail, and pied wagtail. Reed warblers and sedge warblers are found mostly in marshy places, where they build nests in the reeds, usually hanging them among four or five of the larger plants by means of threads of wool or soft grasses. The family of birds called *Sylviidae,* confined to the Old World, includes several typical warblers. On the other hand the tanager family of birds embraces many American species.



BRITISH CRUISER PHOTOGRAPHED WHILE LAYING MINES ON THE COAST OF THE ORKNEY ISLANDS.



THE EFFECT OF A MINE EXPLODING UNDER WATER AT A DEPTH OF ABOUT TWENTY FEET.

Such a mine is capable of great destruction when exploded under or in contact with a ship.

(Opp. 2898.)

WARD (wȧrd), **Artemas,** soldier and jurist, born in Shrewsbury, Mass., Nov. 27, 1727; died there Oct. 26, 1800. In 1748 he graduated from Harvard University, served as lieutenant colonel in the French and Indian wars, and was a prominent member of the Massachusetts Legislature. He was made commander in chief of the Massachusetts troops, in 1775, and commanded at the siege of Boston until the arrival of Washington, when he became second in command. In 1776 he resigned on account of ill health and in the same year became president of the Massachusetts executive council. He served as a member of the Massachusetts State Legislature for sixteen years and was a Federalist Representative in Congress from 1891 to 1895. Both as a jurist and statesman he contributed largely to the welfare of the colonies, his public life being devoted to the best interests of the newly organized republic.

WARD, Artemus, the nom de plume of Charles Farrar Browne, an American humorous writer. He was born at Waterford, Me., April 26, 1834; died in Southampton, England, March 6, 1867. His first work was that of a compositor in a printing office, but he soon became a writer for several weekly and daily journals. He published the first series of writings under the name *Artemus Ward* in the Cleveland *Plaindealer,* in 1858, which he represented to be written by a traveling showman. In 1860 he became editor of a New York humorous weekly called *Vanity Fair,* but the enterprise of publishing it met with financial failure. Shortly after he went upon the platform as a lecturer, his eccentric humor attracting large audiences. He made a tour of England in 1866, where he became popular as a lecturer and contributor to *Punch.* His best known writing is "Artemus Ward: His Book."

WARD, Elizabeth Stuart Phelps. See **Phelps, Elizabeth Stuart.**

WARD, Henry Augustus, naturalist, born in Rochester, N. Y., March 9, 1834; died in 1906. He studied at Middlebury Academy and Williams College. In 1854 he was assistant to Louis Agassiz at the Lawrence Scientific School of Harvard University. Subsequently he studied in Paris and traveled through Europe and the Orient. He returned to the United States in 1860 and was made professor of natural science at the Rochester University, serving until 1865, when he became manager of gold mines in Montana, and in 1871 was naturalist to the United States commission in San Domingo. Subsequently he devoted much time to making large and valuable cabinets of mineralogy and geology, of which many were distributed to colleges and universities in America and Europe. He published "Description of the Most Celebrated Fossil Animals in the Royal Museums of Europe" and "Notices of the Megatherium Cuvieri."

WARD, John Quincy Adams, sculptor, born in Urbana, Ohio, June 29, 1830. He went to Washington in 1857, where he studied sculpture, and later modeled busts of Hannibal Hamlin, Alexander H. Stephens, and others. In 1861 he settled in New York City. To secure a superior model for his bronze cast, "Indian Hunter," he visited the western frontier to study Indian life. He went to Europe in 1872 and again in 1878, and served as president of the National Academy of Design. His productions are admirable because of originality and their exhibiting the spirit of Americanism. Among his best known works are statues of General Lafayette, in Burlington, Vt.; James A. Garfield, in Washington, D. C.; Israel Putnam, in Hartford, Conn.; Roscoe Conkling, in Madison Square; Shakespeare, in Central Park; and Washington, in Wall Street. Other productions include "The Good Samaritan," "The Seventh Regiment Monument," "The Pilgrim," and statues of Henry Ward Beecher, Commodore Perry, and General Thomas. He died May 1, 1910.

WARD, Lester Frank, geologist and sociologist, born at Joliet, Ill., June 18, 1841. He studied in his native State and at the Columbian University, Washington, D. C., graduating from the latter in 1869. Subsequently he studied law, worked seven years in the United States Treasury Department, and was for some time assistant geologist under the government geological Other works include "Outlines of Sociology," is an outline of a system of cosmic philosophy quite in harmony with the theories of Spencer. Other works include "Outlines of Socialogy," "Flora of Washington," "Types of the Laramie Flora," and "Geological Distribution of Fossil Plants." He died April 19, 1913.

WARD, Mary Augusta Arnold, novelist, born on the island of Tasmania, June 11, 1851. She descended from English parents, being a granddaughter of Thomas Arnold of Rugby, and at the time of her birth her father held an educational position in Tasmania. The family returned to England in 1856, where Miss Arnold, in 1872, married Thomas Humphry Ward, editor of "English Poets," "Man of the Reign," and "Reign of Queen Victoria." She began her literary work by writing criticisms for *Macmillan's Magazine* and contributions to *Smith's Dictionary of Christian Biography.* A pleasing story entitled "Miss Bretherton" appeared in 1884, and soon after she published a number of novels. Her later works include "The History



MARY AUGUSTA ARNOLD WARD.

of David Grieve," "Robert Elsmere," "Marcella," "Sir George Tressady," "Lady Rose's Daughter," "The Marriage of William Ashe," "The Story of Bessie Castrell," and "Helbeck of Bannisdale." "Robert Elsmere" is her most successful novel. It has been translated into many languages. She died March 24, 1920.

WARE, a town of Massachusetts, in Hampshire County, on the Ware River, 68 miles west of Boston. It is on the Boston and Albany and the Boston and Maine railroads. The notable buildings include the public library, the town-hall, the high school, and several fine churches. It has sanitary sewerage, rapid transit, and public waterworks. Among the manufactures are cotton and woolen goods, hardware, cigars, machinery, and clothing. Ware was settled in 1673 and was chartered as a town in 1775. Population, 1905, 8,594; in 1920, 8,525.

WAR GAME, or **Kriegs Spiel**, a game invented by Herr von Reisswitz, an officer in the German army. It is played with movable pieces upon a map, which is drawn upon a large scale, and the purpose is to represent a battle or campaign between two contending parties. The importance of the game was emphasized by the war with Austria, in 1866, and became popular in many countries after the Franco-German War. Now it is played extensively among the naval and military men of Europe and America, and the most popular form is to have two players on each side. The movable pieces consist of blocks that represent the troops and sustain the same relation to the field that contending forces would in real war. There are subdivisions, such as cavalry, infantry, engineers, etc. Rules govern the time and distance of the movements. Defeat or victory depends upon the number of men who come together upon the field, the stronger side attaining victory. If both sides are equal as to number and position held, a die is cast to determine the winner.

WARING (wā′rĭng), **George Edwin**, sanitary engineer, born in Poundridge, N. Y., July 4, 1833; died in New York City, Oct. 29, 1898. He was educated at College Hill, Poughkeepsie, where he pursued courses in agriculture and mining. In 1855 he lectured on agriculture in Maine and Vermont. He was drainage engineer of Central Park, New York, from 1857 to 1861. In the latter year he entered the Union army and, after serving for three months in the army of the Potomac, commanded under John C. Frémont, but later was made colonel of the Fourth Missouri cavalry. From 1867 to 1877 he managed the Ogden Farm, at Newport, R. I., and in 1879 became special agent of the Tenth United States census. He was a member of the national board of health for several years, planned a sewerage system for the city of Memphis, and served as street cleaning commissioner for New York City. President McKinley appointed him, in 1898, to investigate the sanitary condition of Havana, with the view of introducing modern sanitation. While there he was attacked by yellow fever, of which he died shortly after returning to New York City.

WARMING AND VENTILATION, two subjects which are closely related and equally important in the economy of health. In the construction of buildings, it should be the aim of the architect to provide such facilities as will best serve to warm the apartments with the greatest possible economy and at the same time provide an ample supply of pure air for the occupants. These terms are in a sense opposed to each other, since pure air must be drawn from outside the building and the air which is on the inside must be constantly replaced by a stream of pure, fresh air. From this fact it will be seen that ventilation in a measure reduces the warmth of a room or apartment. However, both subjects must be kept in mind, as a neglect of either tends to bring on disease and eventually death. In summer warmth is supplied largely by the force of nature, thus requiring only the need of a movement and replacement of the air, but for service in winter warming and ventilation must be installed as distinct systems in most houses.

Though all persons require pure air, the temperature agreeable to them varies somewhat. This depends partly on the physical constitution and state of health and whether the body is exercised while indoors. A temperature of 68° Fahr. is found the most suitable for dwellings and schoolrooms. That ventilation is a matter of importance is due to the circumstance that the foul air passing from the lungs and outward through the pores of the skin does not fall to the floor, but becomes diffused through the surrounding atmosphere. With every breath a small quantity of carbonic acid is given off and every inspiration consumes a certain amount of oxygen; hence, without ventilation, the supply of oxygen is consumed in breathing. An oil light vitiates as much air as a dozen persons and makes impure about 75 cubic feet in an hour. Thus, many breaths and lights rapidly unfit the air for use. It should be made an object to bring the air of a room into a condition as pure as that outside. This can be accomplished only by the best known methods of ventilation when the space within the room is equal to 600 cubic feet for each person.

Heating. Many methods have been devised in which rooms may be adequately warmed. The methods differ according to climatic conditions and the nature and cost of obtainable fuel. Open coal fires were long in favor and are still considered the most healthful. The heat is pure and quite unlike the dry, parched heat of the closed stove, steam pipe, or furnace. However, there is a marked irregularity and a considerable waste of heat where the fireplace is employed. Closed stoves were introduced to overcome the loss of heat attending open fires, but, unlike

them, they do not furnish an efficient ventilator. Rooms warmed by iron stoves, burning either wood or coal, may be ventilated in several ways, as by inlet tubes and registers. Some ventilation is provided by defects in carpentry, as the cracks and crevices at doors and windows. Heating by steam and hot-water systems are now employed in many dwellings and in practically all the large public buildings, offices, and warehouses.

In *steam-heating* the steam passes from a boiler through pipes, which become highly heated and thus warm the rooms. *Water-heating* depends upon the principle of the expansion of water by heat. The pipes, which pass from a heater, are kept filled with water by a supply tank. As the water in the pipes within the heater becomes heated it begins to move upward, owing to its greater lightness when subjected to a high temperature, and colder water rushes in to take its place. Thus, a continual circulation is kept up and the apartments are warmed uniformly. Heating plants of this kind are not only popular in large edifices, but many towns and cities maintain them as a method of supplying heat to a large number of buildings. Heating by electricity is becoming popular for various purposes, especially in railway and street cars.

VENTILATING. All ordinary ventilation depends upon the fact that hot air is lighter than cold air. It is due to this fact that cold air, by the force of gravity, sinks to the lower region and forces the warm air to rise. Hence the air near the ceiling of a warmed room is warmer than that near the floor, flames ascend upward from a burning material, and the warmed smoke of a stove escapes by passing upward in the flue. Two openings are necessary to procure a change of air in a room, one for admission and the other for exit of the air. The outlet should be near the floor, opening into an air shaft, a pipe leading through the roof, with proper orifices at the top. In cases where an outlet shaft is not provided, the outlet should be near the ceiling and always larger than the inlet. Dwellings having an open fireplace are usually ventilated sufficiently, for the reason that a constant current of air sweeps up the flue. In large cities mechanical means are employed to ventilate the great structures in which hundreds of people find lodging or employment. This is done by means of flues, pipes, or shafts, and the supply of air is regulated by means of fans or pumps driven by gas, steam, or electric power. Mines are ventilated by similar methods.

WARNER (wạr'nẽr), **Charles Dudley,** essayist and author, born in Plainfield, Mass., Sept. 12, 1829; died in Hartford, Conn., Oct. 20, 1900. He graduated from Hamilton College in 1851, studied law at the University of Pennsylvania, and in 1854 began the practice of law in Chicago. In 1860 he removed to Hartford, Conn., to become associate editor of the Hartford *Press* with his college classmate, Joseph R. Hawley. This publication was merged with the Hartford *Courant* in 1867 and he continued as co-editor. His first contributions to literature were in the form of a series of letters to the *Courant* while on an extensive foreign trip in Eurasia, and in the meantime he wrote articles for other periodicals. He was co-editor of *Harper's Magazine* from 1884 to 1898, conducting at different times the two departments known as the *Editor's Drawer* and the *Editor's Study.*

Warner was deeply interested in prison reform, and lectured on educational and literary topics. His largest work is entitled "Library of the World's Best Literature," which he edited with the assistance of a number of writers, and it was published in thirty volumes in 1895. "That Fortune," a novel, was his last work. Other writings include "Being a Boy," "My Winter on the Nile Among the Mummies and Moslems," "Captain John Smith," "Relation of Life to Literature," "In the Wilderness," "Washington Irving," "Roundabout Journey," "Backlog Stories," and "People for Whom Shakespeare Wrote." "Our Italy," a description of Southern California, was published by him in 1891. He joined Samuel L. Clemens in publishing "The Gilded Age."

WARNER, Seth, soldier, born in Roxbury, Conn., May 17, 1743; died in Roxbury, Vt., Dec. 26, 1784. He settled in Bennington, Vt., in 1765. At that time the region was in the *New Hampshire Grants.* In the disputes between the settlers and New York, Warner was one of the leaders. He was second in command at the capture of Ticonderoga, when that place was taken by Ethan Allen, and on the following day captured Crown Point, for which he was made a colonel by Congress. He participated with Montgomery in the Canada campaign, took part in the Battle of Bennington, and continued in the service until compelled by ill health to resign, in 1782. Olin Levy Warner (1844-1896), the sculptor, is his great-grandnephew. Among his chief works are "Twilight," "Diana," "May," and "The Dancing Nymph."

WARNER, Susan, authoress, born in New York City, July 11, 1819; died in Highland Falls, N. Y., March 17, 1885. Her first novel, "The Wide, Wide World," was published in 1851 under the pen name of *Elizabeth Wetherell.* This production has been highly popular in the United States, fully 275,000 copies having been sold, and its sale in Europe has been quite as large. Other writings embrace "Melbourne House," "Story of Small Beginnings," "Kingdom of Judah," "Hills of the Shatemuo," "Daisy Plains," and "The Law and the Testimony." "The Wide, Wide World" is regarded one of the most popular novels next to Stowe's "Uncle Tom's Cabin."

WAR OF 1812, the name of an armed conflict between Great Britain and the United

States, sometimes called, in the latter country, the second war of independence. The causes which led up to this war may be traced back to the attitude assumed by Great Britain immediately after the Revolutionary War in treating the new republic, especially in relation to the American foreign trade. Great Britain held to the view that "once an Englishman always an Englishman" and maintained the right to interfere with the American vessels on the high seas and search for seamen claimed to be British subjects, who were taken from them and impressed to serve in the British navy. Several men-of-war were fired upon and compelled to give up seamen in their crew, and those who refused to serve were imprisoned. In addition to claiming the right of impressment, England issued orders to interfere with the American commerce by prohibiting trade by any neutral vessels with the dependencies of any nation with whom she was at war. This greatly interfered with American trade, since France and England were engaged in a war at that time. In 1807 Napoleon had issued the Milan Decree, forbidding commerce of any nation with England or her colonies, and it appeared that the United States would become involved with both countries. However, the proximity of Canada and the desire of France to retain the friendship of America caused Napoleon to revoke his decree, in 1810, and commercial intercourse between the two countries was resumed.

James Madison had in the meantime been elected President as the candidate of the Democratic party, but he was not disposed to favor warlike measures, while his party advocated an aggressive policy against Great Britain. It was said of the President that he "could not be kicked into a war," but the Congress that assembled in December, 1811, passed acts to increase the army and navy and made large appropriations for offensive action. The President finally declared war against Great Britain, on June 18, 1812. This was followed five days later by the withdrawal of the "Orders in Council" by the British, which has established a blockade of European ports and thus excluded American commerce to a large extent. However, the United States was not prepared for war, having made little headway in building up means of offense and defense, while Great Britain had just emerged from a war with France and, therefore, was ready to take decisive action.

An invasion of Canada was the first act of open hostility, but the enterprise proved signally unsuccessful. General Hull, Governor of Michigan Territory, at the head of 2,000 men, was operating against the hostile Indians in the Northwest when war was proclaimed. He had been invested with power to invade Canada and on July 12 crossed the Detroit River with the view of capturing the British post at Walden. General Brock captured a detachment sent out to guard the provisions coming to the American camp and Hull decided to retreat to Detroit without striking a blow. The British were reinforced by a force of Indians under Tecumseh and proceeded to attack Detroit. General Hull, without offering to make resistance, surrendered the fort, with its garrison and stores, to the British on Aug. 16. He was afterward convicted for cowardice and sentenced to be shot, but the President pardoned him in view of his previous services. The second attempt to invade Canada was undertaken by General Van Rensselaer with a force of militia, principally from New York. On Oct. 13 he crossed the Niagara River with a part of his troops and made an attack on Queenston Heights. After gaining possession of the British battery, when General Brock was mortally wounded, the Americans were compelled to retreat, having lost many of their men.

The Americans were more successful in their naval engagements during the first year of the war. Capt. Isaac Hull on Aug. 19, with the frigate *Constitution,* overtook and permanently disabled the British vessel *Guerriere* off the coast of Massachusetts, and the latter vessel was blown up the following day. On Oct. 18 the American vessel *Wasp* captured the *Frolic,* but the British gun ship *Poictiers* soon after captured the *Wasp.* In the same month Commodore Decatur, commander of the frigate *United States,* captured the British *Macedonian.* Captain Porter, the following month, with the *Essex,* pursued the British packet *Nocton* and captured it and its cargo, which included $55,000 in specie. In the same month Commodore Bainbridge, with the *Constitution,* destroyed the British vessel *Java* and took its crew prisoners. President Madison was reëlected in the fall of 1812 and Elbridge Gerry was chosen Vice President.

The Americans undertook a third invasion of Canada at the beginning of 1813. General Dearborn, at the head of 1,700 men, captured York, but was soon recalled and superseded by General Wilkinson, who was joined by a force under General Hampton and the two made a combined attack upon Montreal. The object sought was not attained, but the two armies wintered in Canada. In May the British invaded the State of New York, but they were defeated at Sackett's Harbor. General Harrison built Fort Meigs, on the Maumee, where he was besieged by a force of British and Indians under Proctor, but large numbers of the Indians deserted, and the British abandoned the siege and retreated to Malden. In the meantime Commodore Perry undertook to get control of Lake Erie, which was commanded by a British squadron of six vessels under Commodore Barclay. In September he made an attack upon the British near Put-in-Bay, where he won a complete victory. This destruction of the most important British

fleet upon the Great Lakes enabled the Americans under General Harrison to undertake the fourth invasion of Canada. He pursued the British under Proctor until they took a stand on the Thames River, where they were defeated after a pitched battle on Oct. 5. General Jackson was sent with a force of Americans into Alabama, where the Creeks had taken up arms, and they were completely defeated at Horseshoe Bend in January, 1814. After the battle of the Thames, General Harrison was transferred to Buffalo, where he resigned. The year 1813 closed without decisive results, except that Captain Lawrence, who had been made Commander of the *Chesapeake,* was defeated and slain in an engagement with the British vessel *Shannon,* commanded by Captain Broke.

Another invasion of Canada was undertaken in the spring of 1814. Three thousand Americans under Generals Scott and Ripley crossed the Niagara early in July and soon captured Fort Erie. They were met by the British under General Rial near the Chippewa River, where they won a victory, and the British retreated to Burlington Heights. The Battle of Lundy's Lane, the hardest fought engagement of the war, occurred on July 25. Each side lost about 800 men and neither gained material advantages, but the Americans withdrew to Fort Erie, where they were besieged until in September, when the British works were carried. The British under General Drummond retreated to Fort George, while the Americans went into quarters at Black Rock and Buffalo. In September, 1814, the British under General Prevost invaded New York by way of Lake Champlain. His fleet was defeated near Plattsburg under Commodore McDonough and the land forces were repulsed about the same time. However, the British ascended Chesapeake Bay, defeated the Americans at Bladensburg, and captured the city of Washington, where the government buildings were sacked. Many people of New England were opposed to the war and sent delegates to a convention at Hartford, Conn., where they published an address after a secret session of three weeks. This session was declared disloyal by the Democrat party and the political prospects of those that took part in it were ruined.

Spain sympathized with Great Britain during the War of 1812, and the British were permitted to fit out an expedition at Pensacola. General Jackson proceeded against that point and expelled the British from Florida. Having learned that the British were landing at New Orleans and preparing to conquer Louisiana, he proceeded to undertake to drive them out, being supported by 2,000 Tennessee riflemen. Four miles below the city, at Chalmette, he took a strong position. The British were under command of General Pakenham, who had arrived with reënforcements and taken command of the British troops. Several attacks were made at different times, but the final battle occurred on Jan. 8, 1815, when the British were defeated with heavy losses, including Generals Pakenham and Gibbs. This battle was fought two weeks after peace had been concluded, but this was unknown to the contending parties at New Orleans. The war ended with the Treaty of Ghent, in Belgium, and both countries received the news with deep satisfaction. No mention was made of the issues that brought on the war. The treaty was devoted chiefly to the settlement of unimportant boundaries and the possessions of small islands in Passamaquoddy Bay.

WARRANT (wŏr′rạnt), in law, a writ which gives an officer an authority over the persons or property of others. The term is more frequently applied to writs for the arrest of persons, which may be issued by a justice of the peace or under the order of a higher court or the grand jury. A *search warrant* gives authority to an officer to search private premises for specified goods or property belonging to another. The term *bench warrant* is applied to an order issued by the judge for the arrest of a person.

WARRANTY, in law, a term used in distinct connections, especially to indicate a covenant on the part of the grantor in the conveyance of title to real property. An instrument of this kind is called a *warranty deed.* The term applies in insurance to indicate an undertaking on the part of the insured that certain alleged facts are as he represents them to be. In the sale of personal property the term warranty indicates that the seller guarantees the title or the quality of the property sold. Such warranties may be either expressed or implied.

WARREN (wŏr′rĕn), a city in Ohio, county seat of Trumbull County, on the Mahoning River, 52 miles southeast of Cleveland. It is on the Erie, the Pennsylvania, and the Baltimore and Ohio railroads. Warren is surrounded by a rich farming and dairying country, which contains deposits of bituminous coal, iron ore, petroleum, and building stone. The noteworthy buildings include the county courthouse, the public library, and a number of fine churches. Gas and electric lighting, pavements, waterworks, and rapid transit are among the municipal facilities. The manufactures include furniture, flour, cigars, woolen goods, and wearing apparel. It has an extensive trade in farm produce and merchandise. The place was settled in 1799 and incorporated in 1834. Population, 1920, 27,050.

WARREN, a city in Pennsylvania, county seat of Warren County, on the Allegheny River, ninety miles south of Buffalo, N. Y. It is on the Pennsylvania and other railroads and is in close proximity to the oil and coal regions of the State. The principal buildings include the public library, the county courthouse, the high school, and the Pennsylvania Hospital for the Insane. Among the manufactures are boilers, farming implements, flour, furniture, hardware,

carpets, cotton and woolen goods, and machinery. Electric lighting, pavements, and public waterworks are among the utilities. The surrounding country produces large quantities of fruit and dairy products. It has a growing trade in cereals and other produce. The place was settled in 1795 and incorporated in 1832. Population, 1900, 8,043; in 1920, 14,256.

WARREN, a town of Rhode Island, in Bristol county, ten miles southeast of Providence. It is situated on Narragansett Bay and on the New York, New Haven and Hartford Railroad. The chief buildings include the public high school, several fine churches, and the Hall Library. It has manufactures of cotton goods, clothing, braid, earthenware, and machinery. Warren occupies the site of Sowams, an Indian village in which Massasoit resided. The first settlement by whites was made in 1635 and it was incorporated in 1746. Population, 1905, 5,613; in 1920, 7,841.

WARREN, Gouverneur Kemble, soldier, born at Coal Springs, N. Y., Jan. 8, 1830; died Aug. 8, 1882. He graduated at West Point in 1850 and was connected with the corps of topographical engineers in the western states for several years. In 1859 he was chosen professor of mathematics at West Point, but became colonel of volunteers at the beginning of the Civil War. Gallant service at Gaines's Mill caused him to be promoted brigadier general in 1862. Afterward he distinguished himself at Malvern Hill, Fredericksburg, Gettysburg, in the Wilderness, and at the siege of Petersburg. In 1865 he was brevetted major general in the regular army and as major of engineers had charge of surveys and harbor improvements. He published several books relating to his public services.

WARREN, Joseph, physician and soldier, born in Roxbury, Mass., June 11, 1741; slain in the Battle of Bunker Hill, June 17, 1775. He graduated from Harvard University in 1759 and, after studying medicine, settled in Boston to practice his profession. Immediately after the Boston massacre of March 5, 1770, he was made one of the committee of safety and in 1774 was president of the provincial congress. That body made him a major general, but he preferred to fight as a volunteer. He took a prominent part in the Battle of Bunker Hill and, while endeavoring to rally the militia, was struck by a ball in the forehead and was killed instantly. Warren was noted as an orator and delivered two memorable orations on anniversaries of the Boston massacre. On June 17, 1857, a statue by Henry Dexter was erected to his honor at Bunker Hill.

WARREN, William Fairfield, educator and theologian, born at Williamsburg, Mass., March 13, 1833. He graduated from the Wesleyan University, Middletown, Conn., in 1853, and studied in Andover Theological Seminary and the universities of Berlin and Halle. In 1855 he became a minister of the Methodist Church, being connected with the New England conference until 1861, when he was made professor of theology in the Methodist Episcopal Institute at Bremen, Germany. After five years he became professor of systematic theology in the Boston School of Theology and was chosen president of the Boston University in 1873, serving until 1903, when he became dean of the School of Theology, Boston University. His publications are very numerous, including chiefly works on comparative theology and the philosophy of religion. They include "In the Footsteps of Arminius," "True Key to Ancient Cosmology," "The Story of Gottlieb," "Paradise Found—the Cradle of the Human Race at the North Pole," "Religions of the World and the World Religion," and "Constitutional Law Questions of the Methodist Episcopal Church."

WARRENSBURG (wŏr′rĕnz-bûrg), a city of Missouri, county seat of Johnson County, on the Black River, 65 miles southeast of Kansas City. It is on the Missouri Pacific Railroad and is surrounded by a fertile farming region. In the vicinity are mineral springs and deposits of blue sandstone. The manufactures include flour, woolen goods, farming implements, hardware, and machinery. Among the features are the county courthouse, the Masonic Temple, the opera house, the high school, the State normal school, and the Pertle Springs Park. It has public waterworks, sanitary sewerage, and well-graded streets. The place was settled in 1835 and incorporated in 1856. Population, 1900, 4,724; in 1920, 4,811.

WARSAW (wạr′sạ), the capital of Poland and of the government of Warsaw, on the Vistula River, 650 miles southwest of Petrograd. It is the converging center of a number of important railroads and has good transportation facilities by several canals and the Vistula River. Many bridges cross the river and connect the city with the suburb of Praga. The older parts of the city have narrow and irregular streets, but as a whole it is one of the most pleasant cities of Western Europe, and ranks next to Moscow and Saint Petersburg as the most beautiful city of Russia. The streets are paved substantially. They are supplied with all the modern improvements, such as sidewalks, gas and electric lights, sewerage, waterworks, rapid transit, and extensive telephone systems.

Warsaw has many beautiful buildings, including about thirty palaces and the Cathedral of Saint John, a substantial structure dating from 1250. The Lutheran Church is the loftiest building of Warsaw and contains fine paintings and a number of connected chapels. It has a large group of other churches and synagogues, excellent public and private schools, numerous hospitals and charitable institutions, and several important scientific and educational associations.

The University of Warsaw, founded in 1816, has fine botanic gardens, an observatory, a museum, and a library of 475,000 volumes. It is attended by 1,350 students. Many beautiful monuments, statues, parks, and gardens adorn the city. The principal streets are beautified by large, substantial, and artistic architecture. Among the manufactures are cotton and woolen goods, boots and shoes, carpets and clothing, leather and saddlery, wagons and carriages, musical instruments, silver-plated ware, spirituous liquors, cigars, chemicals, engines, and machinery. The general export trade is very extensive.

It is not certain when Warsaw was founded, but its history since the 16th century is closely connected with that of Poland. The Swedes and Russians contended for its possession throughout the 17th century. It was greatly improved by the Germans under Augustus II. and Augustus III. Russia came into possession of it in 1764, but it was annexed to Prussia in 1795, and was occupied by the French under Napoleon in 1806. The Treaty of Tilsit made it the capital of the independent duchy of Warsaw, but it was taken by Austria in 1809 and was annexed permanently to Russia in 1813. An unsuccessful insurrection occurred in 1830-1831, which was followed by the confiscation of numerous estates and the deportation of many insurrectionary leaders to Siberia. A severe military rule was maintained until 1856, but another general insurrection occurred in 1863. This movement was put down with much energy by the Russians, who closed the scientific and educational institutions, deported many of the leaders to Siberia, and confiscated the landed interests of the nobles. It has been the continued policy of Russia to supplant the Polish language with the Russian and thereby crush the spirit of independence that has for centuries animated the Poles. The city has grown in population and commercial interests with a remarkable regularity for the past quarter of a century. In 1915 it was captured by the Germans after a short siege. The inhabitants include about 95,000 Germans and a large number of Jews. Population, 1914, 968,741.

WAR SHIP, the general name applied to any vessel that is armed and equipped for purposes of war. The first element considered by the naval architect in designing a war ship is its displacement, by which is meant the actual weight of the ship. This is of course exactly equal to the weight of water which the vessel displaces and in the judgment of the architect is distributed among the several parts. A portion is allotted to the hull, part to the motive power, and various proportions to the guns, stores, fuel, armor protection, and general equipment. Whatever excess is given to one element must be deducted from another, since the ship would otherwise exceed the desired displacement. Some elements in a ship of a given size cannot be varied greatly, such as the weight of the hull, stores, and furnishing, but considerable latitude may be exercised in planning the engines, armour, and fuel supply, depending upon the type of vessel that is under consideration.

In a fast-sailing ship, which has a speed of 23 knots, a large proportion of the weight is allotted to the motive power, hence the vessel can have a comparatively light battery of guns and slight armor protection. On the other hand, a more heavily armed and armored ship must necessarily have comparatively less speed, possibly from 20 to 21 knots, since the weight saved on the motive power enters into a more complete protection for the guns and heavier armament. A ship that has a speed of from 15 to 17 knots an hour, while losing in rapidity of movement, gains in the manner of greater protection and carries heavier guns and greater stores. Ships that are swift, but are lightly armed and armored, belong to the class known as *protected cruisers,* while the less speedy, but more heavily armed and armored ships, are classed as *armored cruisers.* A battleship is slowest in speed, but it has the capacity for taking and giving the heaviest blows that can be inflicted by modern guns. At present the tendency is to sacrifice speed for the power of offense and defense, but most governments supplement the more powerful ships with vessels of higher speed so as to build a fleet that contains representatives of both classes.

The British battleship *Dreadnaught,* completed in 1906, formerly was one of the most powerful war ships afloat. It has a speed of 21 knots an hour, with a displacement of 18,500 tons, and was constructed at a cost of about $8,000,000. On the upper deck are ten 12-inch guns, so located that six can be fired either ahead or astern, and eight may be fired broadside. In addition to these it carries eighteen 3-inch guns as a means of defense against torpedo boats and other smaller vessels. With this powerful war ship may be compared the *Connecticut* of the United States navy, launched in 1904. It has a displacement of 18,000 tons, with a speed of 18 knots, and cost about $4,500,000. The length of this vessel is 456 feet and its breadth is 77 feet. It is protected by Krupp armor eleven inches thick amidships, whence it tapers to nine inches below the water line. It is equipped with four 12-inch breech-loading guns, two of which are located within a turret at each end of the ship, and twelve 7-inch guns are dispersed in casemates along the turrets. It is further supplied with numerous other guns for offensive and defensive action, such as rapid-firing guns and torpedoes. The *Connecticut,* at the time of being launched, was the most powerful vessel of the United States navy. While it is inferior in speed to the *Dreadnaught,* it is considered by many at least equal to the latter

as a forceful implement of warfare. More recently many vessels of the *Dreadnaught* type have been launched by Germany, Japan, and the United States, such as the *Montana,* the *North Carolina,* and the *South Dakota* of the last named country. See **Navy; Ship, etc.**

WARTBURG, a famous castle of Germany, in Saxe-Weimar, near the city of Eisenach. It first became famous on account of the *War of the Wartburg,* a name given to a poetic contest held here about 1206, in which the Minnesingers, including Walther von der Vogelweide, were the contestants. The castle was occupied at that time by Hermann, landgraf of Thuringia, who made his court a refuge for musicians, scholars, and artists. A second circumstance that made the castle famous is that it was the scene of the legend of Saint Elizabeth of Hungary, who was the wife of a Thuringian landgraf. The next and greatest of all important events is that connected with the life of Luther, who occupied rooms in the castle after the famous diet of Worms, when he translated the Bible into German. In 1867 the 8th century of its foundation was made the occasion of a general celebration. The 300th anniversary of the Reformation was celebrated at Wartburg by German students in 1817.

WARTHE (vär'tę), a river of Germany and Poland, the largest tributary of the Oder. It rises in the western part of Poland, 35 miles northwest of Cracow, and, after a course of 540 miles toward the northwest, joins the Oder about 20 miles north of Frankfort. The Warthe is navigable for 250 miles and its importance is greatly enhanced by several canals. Its valley is a highly fertile region, producing grasses, sugar beets, cereals, and fruits.

WART HOG, an animal of the swine family, which is native to Southern Africa. It is peculiar because of having several warty growths



WART HOG.

on each side of the face and tusks in both jaws, which curve upward and outward. The tusks are an enlargement of the molar teeth, and their composition is similar to that of the tusks of an elephant. Wart hogs have a large head and feed on roots and bulbs of plants. The river, or water, hogs of Central Africa are allied animals, but are peculiar for spending much of the time in water. They are savage and ill-looking. The flesh of both species is esteemed as food.

WARWICK (wär'wĭk), a town of Rhode Island, in Kent County, five miles south of Providence. It is situated on Narragansett and Cowesett bays, the Providence and Pawtuxet rivers, and on the New York, New Haven and Hartford Railroad. The chief industries include machine shops, foundries, cotton mills, and canning and curing establishments. Among the public utilities are electric and gas lighting, waterworks, sewerage, and electric street railways. The streets are improved with pavements and avenues of shade trees. It has an extensive trade in merchandise and manufactured products. The first settlement in the vicinity was made in 1642, when it was known as Shawomet, and was later named in honor of the Earl of Warwick. It is the birthplace of Nathaniel Greene. Population, 1920, 15,461.

WARWICK, Richard Neville, Earl of, an English nobleman, born in 1428; slain in the Battle of Barnet, April 14, 1471. His father, Richard Neville, was an Earl of Salisbury, and the son became Earl of Warwick by his marriage to the daughter of the Earl of Warwick. By this marriage he came into possession of the vast estates of the Warwick family. Accordingly he was reputed the most powerful noble in England and exercised such influence in public affairs that he became known as the King Maker. He first sided with the Duke of York in the War of the Roses, and his services at the Battle of Saint Albans were rewarded by the governorship of Calais. It was through his influence that Edward IV. became King of England, on June 22, 1461, instead of Henry VI., but when the former married Elizabeth Woodville, the earl married his own daughter to young Edward, son of Henry VI. Subsequently he went over to the Lancaster party under Queen Margaret, with the expressed condition that his son-in-law should become successor to the throne. Accordingly Henry VI. was restored and Edward IV. fled to Holland, but the latter returned to England with an army and defeated the forces of Warwick in the Battle of Barnet. It is said of Warwick that he entertained 30,000 guests daily and owned 100 manors. He is frequently spoken of as the Last of the Barons.

WASHBURN (wŏsh'bûrn), a city of Wisconsin, county seat of Bayfield County, sixty miles east of Superior. It is situated on Chaquamegon Bay, an inlet of Lake Superior, and on the Northern Pacific and the Chicago, Saint Paul, Minneapolis and Omaha railroads. The city has a fine harbor and is the center of a large trade in grain, lumber, and building stone. The chief buildings include the public library, the

high school, and the county courthouse. It has manufactures of lumber products, clothing, cigars, spirituous liquors, and machinery. Near the city is a large dynamite plant. Electric lighting, waterworks, and sewerage systems are among the public utilities. The first settlement in the vicinity was made in 1665, when a Jesuit mission was established here, which was one of the first settlements in the State. Population, 1905, 7,284; in 1920, 1,441.

WASHBURN, Cadwallader Colden, soldier and capitalist, born in Livermore, Me., April 22, 1818; died May 14, 1882. He removed to Iowa in 1839, but later settled in Illinois, where he studied law. In 1842 he began to practice his profession at Mineral Point, Wis., where he gave special attention to banking and the real estate business. His investments in timber lands and flouring mills proved highly profitable. He was elected to Congress in 1854 and served consecutively until 1861, when he raised a force of volunteers to be mustered into the Federal service in 1862. During that year he served under General Curtis in Arkansas, was promoted to the rank of brigadier general, and soon after was made a major general. Besides commanding at Haines's Bluff, Miss., he took part in the campaign against Vicksburg. In 1866 he was elected to Congress, serving until 1871, and the following year was elected Governor of Wisconsin. He built an observatory at the University of Wisconsin and is the founder of an orphan asylum at Minneapolis, Minn.

WASHBURNE, Elihu Benjamin, statesman, born in Livermore, Me., Sept. 23, 1816; died in Chicago, Oct. 22, 1887. In 1833 he entered the office of the *Christian Intelligencer* with the view of becoming a printer and two years later engaged as a printer on the *Kennebec Journal,* at Augusta. Subsequently he studied law at Harvard Law School and, after being admitted to the bar, in 1840, engaged in the law practice at Galena, Ill. He was elected to Congress in 1852, serving in that body until 1869. His long service caused him to be called the *Father of the House,* and his close scrutiny of all bills appropriating public funds gave him the name, *Watchdog of the Treasury.* Among the bills opposed by him with great persistence were those granting subsidies to railroads, those appropriating public lands, and the bill making the government claim on the Union Pacific Railroad subordinate to private mortgages.

President Grant made him Secretary of State in 1869, but he resigned that office to become minister to France. The Franco-German War occurred within that period and he gained the friendship of both the Germans and French in giving protection to those unable to leave Paris. Emperor William I. of Germany conferred upon him the Order of the Red Eagle in recognition of his services, but this he declined on constitutional grounds. He published "Recollections of a Minister to France." His brother, Cadwallader C. Washburn, was a distinguished soldier in the Civil War and his brother, Charles Ames Washburn (1822-1889), is celebrated as a scholar and diplomat and served as commissioner to Paraguay in 1861. The last mentioned published "History of Paraguay," "From Poverty to Competence" and "Political Evolution."

WASHBURNE, William Drew, statesman, born in Livermore, Me., Jan. 14, 1831; died July 29, 1912. He was U. S. Senator from 1889 until 1895, where he was a recognized leader on the Republican side. Washburne was interested in large flouring and manufacturing enterprises in Minneapolis, promoted the Minneapolis Water Power Company, and served as president of the Minneapolis and Saint Louis Railroad. He supported Lincoln throughout the war.

WASHINGTON (wŏsh'ĭng-tŭn), a city in Indiana, county seat of Daviess County, twenty miles east of Vincennes, on the Evansville and Terre Haute and the Baltimore and Ohio Southwestern railroads. It is surrounded by a fertile farming and dairying country. The chief buildings include the public library, the county courthouse, and many fine schools and churches. Among the manufactures are earthenware, cigars, machinery, clothing, and hardware. Large quantities of bituminous and cannel coal are mined in the vicinity. The city has a large trade in grain, coal, flour, lumber, and live stock. It is improved by electric lights, waterworks, pavements, and street railways. Population, 1900, 8,551; in 1920, 8,705.

WASHINGTON, a city of Iowa, county seat of Washington County, 65 miles southwest of Davenport. Transportation facilities are provided by the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul, and the Chicago, Rock Island and Pacific railroads. It is surrounded by a fertile farming and stock raising country. The features include the county courthouse, the high school, the public library, and municipal waterworks. It has manufactures of flour, earthenware, and machinery. Population, 1905, 4,489 ; in 1920, 4,697.

WASHINGTON, county seat of Beaufort County, N. C., 127 miles east of Raleigh, on the Pamlico River and on the Atlantic Coast Line Railroad. It has a large trade in cotton, lumber, corn, rice, and fish. The features include the courthouse, high school, and postoffice. It was settled in 1726 and incorporated in 1776. Population, 1920, 6,166.

WASHINGTON, a city in Pennsylvania, county seat of Washington County, thirty miles southwest of Pittsburg, on the Baltimore and Ohio, the Pittsburg, Cincinnati, Chicago and Saint Louis, and other railroads. Deposits of natural gas and bituminous coal abound in the surrounding country, which also produces cereals and dairy products. It is the seat of Washington and Jefferson College, which was founded

as Washington Academy in 1787. Other features include the public library, the county courthouse, the Y. M. C. A. building, the Washington Female Seminary, Trinity Hall, and many fine churches. It has manufactures of flour, woolen goods, ironware, machinery, and farming implements. Electric lights, pavements, sewerage, and rapid transit are among the municipal facilities. The place was first settled in 1768, when it was known as Bassettown, but was incorporated under its present name in 1784. Population, 1900, 7,670; in 1920, 21,480.

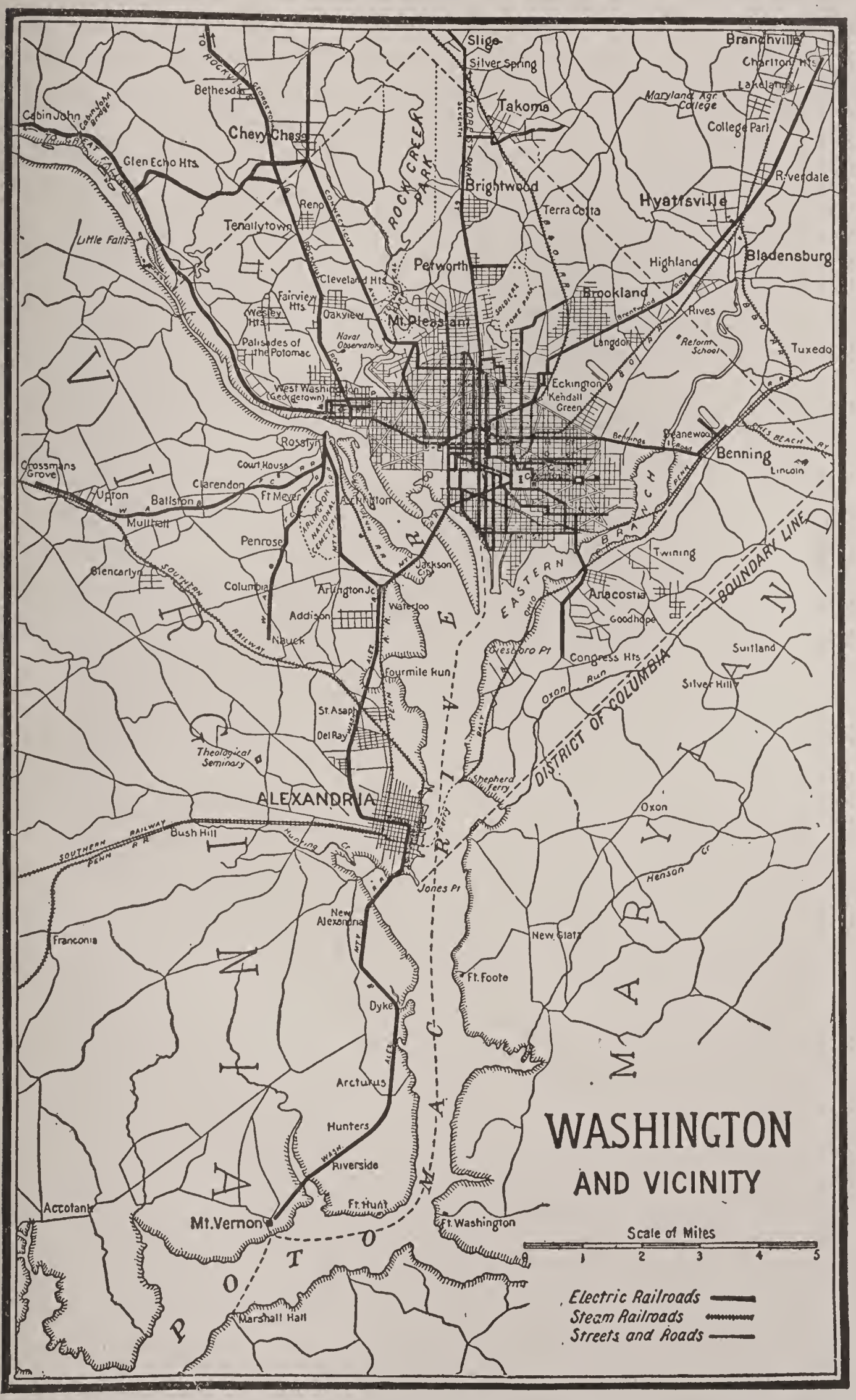
WASHINGTON, the capital of the United States, situated in the District of Columbia (q. v.), on the Potomac River, 40 miles southwest of Baltimore. It occupies a beautiful site on the east bank of the Potomac River, about 100 miles from its entrance into Chesapeake Bay, at the junction with the Anacostia, or East Branch, and is the head of navigation and tide water. Originally the tract occupied by the city was 10 miles square, ceded by Maryland and Virginia to the Federal government, but the Virginia portion was given back in 1846, and the territory now belonging to the city comprises 70 square miles, of which about 10 square miles are water surface. Near the Potomac the land is low, but it rises gradually from the margin of the water, and the general elevation is about 100 feet, though the higher parts reach an altitude of 250 to 400 feet. Georgetown, situated in the western part of the District, is separated from the main part of the city by Rock Creek and is now frequently spoken of as West Washington. The Anacostia, or Eastern Branch, flows into the Potomac in the southeastern part of the city. Anacostia Island is a tract of land in the Potomac, opposite the mouth of Rock Creek.

Description. The principal streets are wide and range from 80 to 160 feet. They are paved largely with asphalt in the main parts of the city and farther out the pavements are of macadam. The sidewalks and curbs are almost exclusively of cement. Beautiful shade trees line the streets, though they are confined principally to the residential sections. The broad transverse avenues that cross the streets diagonally are named after the states of the Union. At the time this arrangement was agreed upon, it was decided to name the great central avenue after Pennsylvania, the *Keystone State*. South of this the avenues received the names of the Southern States, the avenues which cross Pennsylvania were named after the Middle States, and those north of it were designated for the New England States. The rectilinear streets have a direction north and south and east and west with the points of the compass. Those running east and west are known by the letters of the alphabet, hence are designated North A and South A, North B and South B, etc. At right angles to the alphabetical streets are the thoroughfares that bear numbers and their house enumeration begins at a line running due north and south through the Capitol. In this way the city is divided into four quarters, known as Northwest, Northeast, Southwest, Southeast. In each section the houses are numbered upon the decimal system, that is, 100 numbers for each block. In addressing mail intended for different parts of the city, it is advisable to add after the addresses the designation of the quarter by its initials, but it is customary to omit the letters N. W. from mail intended for the Northwest section, since the greater part of the business houses are within that quarter.

Transportation. The city has steamboat connection by the Potomac with ports on Chesapeake Bay and the Atlantic and the landing for vessels is at the foot of Seventh Street. Inland transportation is by the Baltimore and Ohio, the Pennsylvania, the Southern, the Chesapeake and the Ohio, the Atlantic Coast Line, and other railways. The Cumberland Canal extends along the Potomac River above Washington, but is not used extensively, except to some extent for freighting. Intercommunication is by a system of electric railways, which have branches to all parts of the city, and with it are connected interurban railways that extend to Alexandria, Mount Vernon, Arlington, Georgetown, Anacostia, Bladensburg, Brightwood, and many other points. Tourists have the advantage of being able to obtain excellent service by cabs and automobile conveyance to all parts of the city. North of Capitol Hill is the new Union railway station, one of the finest in the country, erected at a cost of $4,000,000.

Parks. More than 300 squares and reservations are formed at the intersections of the rectangular streets with the broad transverse avenues, and they are uniformly beautified by shrubs and trees, with interspersing of flowers and statuary. The most important reservations are located between Capitol grounds and the Washington Monument, known as the Mall, stretching a distance of about one mile from east to west. The entire tract is about four blocks wide and within it are the government's botanical gardens and conservatory, fine beds of flowers, native and foreign plants, and numerous substantial and imposing buildings. Extending north of the west end of the Mall are the Executive grounds, a finely improved and ornamented tract. At the north end of the Executive grounds are the private gardens of the White House, the official residence of the President. Across Pennsylvania Avenue, north of the White House, is the beautifully ornamented Lafayette Square. Originally there was no provision for additional parks, since the tracts which are included in the Mall and the small park have a total of 617 acres, but more recently Potomac Park has been added. This tract has been reclaimed from the Potomac River, contains 740 acres, and serves as a western extension of the

Mall. The National Zoölogical Park lies some distance north of Potomac Park, on Rock Creek, and immediately north of it is Rock Creek Park. These two parks include 1,700 acres and their



broken and picturesque aspects make them popular public resorts.

MONUMENTS. Foremost among the monuments is the one erected to the memory of George Washington, a beautiful structure of pure white marble. It is 555 feet high, erected at a cost of $1,187,710, and is the most lofty in the world. Within is a staircase of 900 steps, which winds its way to the top around an interior shaft of iron pillars, within which is an elevator sufficiently large to carry 30 persons. The elevator carries sight-seers 517 feet above the ground, where the country may be viewed for a distance of 15 to 20 miles from eight small windows. Lafayette Park contains a statue of Lafayette and one of Rochambeau. A bronze group to commemorate Lincoln stands in Lincoln Park. Other memorials of beauty include those erected to Martin Luther, Daniel Webster, Benjamin Franklin, James A. Garfield, Andrew Jackson, John Marshall, Samuel Hahnemann, Nathanael Greene, Winfield S. Hancock, and Admiral Farragut. Oak Hill Cemetery, on Georgetown Heights, is the most beautiful burial ground. Rock Creek, Congressional, Mount Olivet, and Glenwood are other noteworthy cemeteries.

CAPITOL. Capitol Hill is the site of the Capitol of the United States, one of the most beautiful buildings of the kind in the world. This structure stands near the center of a park, which has an area of sixteen city blocks, and is located immediately east of the Mall. The base of the

Capitol is elevated 90 feet above the Potomac. The building is 751 feet long, 348 feet wide, and above its dome, 287 feet high, is a bronze statue of Liberty. All the apartments are substantially finished and beautifully decorated. The exterior of the structure is of white marble. The largest room in the building is the hall of the House of Representatives, which contains seats for the representatives and delegates from the states and territories, and its galleries have a seating capacity for 1,650 spectators. Next to it in size is the Senate chamber, which has seats for the senators from the states and accommodations for 1,150 spectators. Other interior apartments of much beauty include the hall for the Supreme Court, the national memorial hall, and the rooms set apart for the President and the Vice President. Both of the latter are adorned with magnificent mirrors and finished in the purest of Carrara marble. Beautifully platted and finely decorated grounds surround the Capitol. Pennsylvania Avenue leads from the Capitol to the White House and may be regarded equal in beauty to any street in the world.

BUILDINGS. About one mile and a half northwest of the Capitol is the White House, the official residence of the President. Unfortunately the beautiful grounds surrounding the White House cannot be seen from the Capitol, since the view is partly cut off by the Treasury building. The White House was built in 1792 and was first occupied by President Adams. It was destroyed by the British in 1714, but was restored four years later, and since then a number of improvements have been made. On a line between the White House and the Capitol are the Treasury and the Post Office departments, and west of the White House are those of the War, Navy, and State departments. The Interior Department, the Federal Printing Office, the Patent Office, and the Pension Office are located in the northwest quarter. A short distance east of the Capitol is the Library of Congress, the finest building of the kind in the world. This library contains a vast collection of books, photographs, pamphlets, pieces of music, and manuscript. The ordnance factory is a great workshop of the government, on the site of the old navy yard, and south of the Mall is the Bureau of Engraving and Printing. A short distance from the latter is the Agricultural Department, near which are the Smithsonian Institution, the National Museum, the Army Medical Museum, and the United States Fish Commission. The Washington Barracks are located on the point of land that separates the Anacostia from the Potomac River, and the government hospital for the insane is situated on the north side of the Anacostia. On the west side of the Potomac, in Virginia, is the famous Arlington National Cemetery, formerly the home of Robert E. Lee.

The city has many fine structures that are not classed with those of the government. These include many business buildings and ecclesiastical structures of great value. Among the leading churches are the Church of the Covenant (Presbyterian), on Connecticut Avenue; the Saint John's (Episcopal), on Lafayette Square; the Metropolitan Memorial (Methodist), on Four-and-a-half Street; the Calvary (Baptist), at H and Eighth streets; the Lutheran Memorial, on Thomas Circle; the Christian Memorial, on Vermont Avenue; the Saint Matthew's (Roman Catholic), on Rhode Island Avenue; the First Congregational Church, at G and Tenth streets; and the Church of All Souls (Unitarian), at L and Fourteenth streets. The public library, on Mount Vernon Square, was given by Andrew Carnegie. Corcoran Art Gallery, the gift of W. W. Corcoran, on Seventeenth Street, is a beautiful structure and contains valuable works of art. Among the leading clubs are the Cosmos, the Columbia Athletic, the Chevy Chase, the Gridiron, the Army and Navy, and the Y. M. C. A. of Washington. The leading places of amusement include the Belasco, Chase's Grand Opera, the National Theater, the Academy of Music, the Kernan's Lyceum, and the Butler's Bijou. Among the principal hotels are the Montrose, the Regent, the Shoreham, the Saint Louis, the Ebbitt, the Riggs, the Willard, the Dewey, the Crafton, the Arlington, and the Cairo.

EDUCATIONAL. The public schools are well organized and generally attended, in fact the patronage of these schools is larger proportionally than in most of the larger cities. This system of schools was organized in 1800 and was presided over by a board of trustees of which Thomas Jefferson was the first president. Among the institutions of higher learning are the Carnegie Institution, the American University (Methodist), the Columbia University, the Georgetown University, the Catholic University of America, and Howard University. Many institutions afford splendid facilities for educational work in special departments, such as the Smithsonian Institution, the Library of Congress, the Bureau of Labor, the Bureau of Education, the Bureau of Fisheries, the Army Medical Museum, etc. The city has many educational and scientific associations. Numerous hospitals, homes, asylums, and relief societies are maintained.

INDUSTRIES. Though the city includes among its inhabitants many employees of the government, it is the permanent home of a large majority of its people. This gives rise to many industrial enterprises of vast extent, especially in the line of manufacturing. Within the city are 2,775 establishments that engage in manufacturing, and the value of the output is $50,500,000 per year. About one-fifth of the total product is obtained from the establishments managed by the government. Cotton and woolen goods, jewelry, scientific instruments, wearing apparel,



NORTH FRONT OF THE WHITE HOUSE.



EAST FRONT OF THE NATIONAL CAPITOL.

(Art. Washington, D. C.)

ironware, machinery, and musical instruments are among the leading products. Many extensive publishing houses have their seat in the city. Washington is important as a market for fruits, food products, and merchandise. It is the center of a large wholesaling and jobbing trade.

GOVERNMENT. The inhabitants of Washington have no direct vote in appointments to office within the city or in national affairs, but the government is directed by the Federal authorities. It is vested in a board of three commissioners, who serve for three years, two of whom are appointed by the President with the consent of the Senate and one is detailed by the Secretary of War. They have authority as empowered by Congress, and in them is vested the appointment of all clerks and subordinate officials. One-half of the expenditures are provided for by an appropriation of Congress and the remainder is raised by assessment upon the District. This plan of raising revenue is thought equitable for the reason that much of the property belongs to the United States, which is estimated, including the streets, to constitute about one-half of all the property. Extensive systems of waterworks, sanitary sewerage, and gas and electric lighting are maintained.

INHABITANTS. In 1900 the city had a population of 278,718, which included 86,702 colored inhabitants. The census of 1920 places the population of the District of Columbia at 437,408.

HISTORY. The site occupied by the city was selected by George Washington when the region was sparsely settled. The town was first called by its present name in 1791, when it had only 3,000 inhabitants. Pierre Charles L'Enfant, a French civil engineer, was employed to prepare the plan for the city proposed to be built. Washington selected the site and marked the boundaries, and the plans drawn up by the engineer were accepted by the commissioners in 1792. The British captured it in 1814, after a weak resistence at Bladensburg, and many of the public buildings were destroyed by fire. All the public buildings, including the residence of the President, were restored within the next few years. At the time of the Civil War it contained a population of 61,000 and was repeatedly threatened by Confederate armies, especially in 1864, when General Early advanced to within a few miles of the city. Georgetown was settled as early as 1695, occupying an elevated site on the Potomac. It remained an independent corporation from 1789 until 1878, when it was annexed to the city of Washington. Since that time the city has made rapid strides of advancement in population and industrial growth.

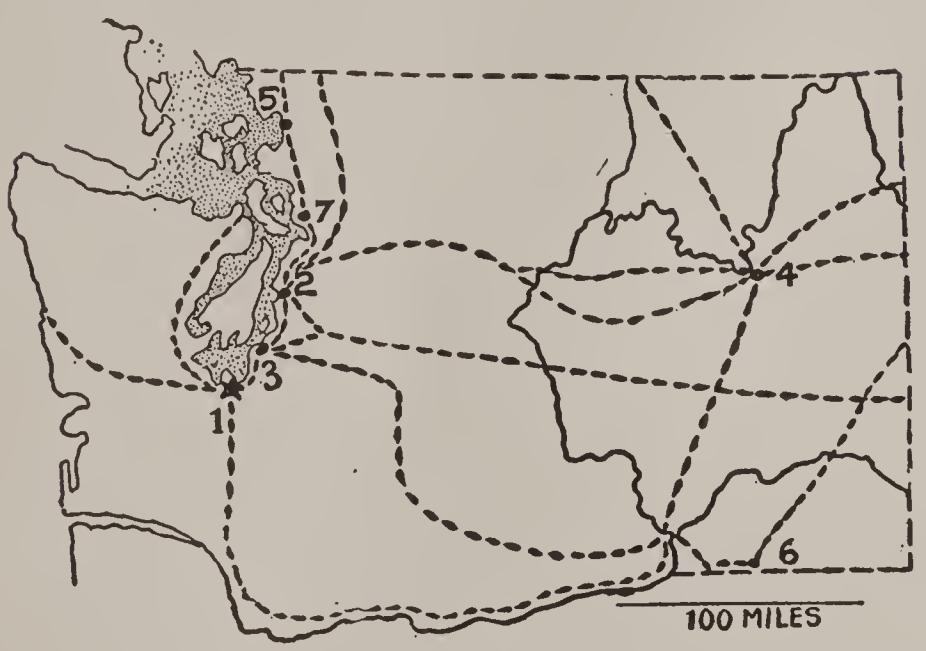
WASHINGTON, a western State of the United States, in the northwestern part of the country, popularly called the *Corner State.* It is bounded on the north by British Columbia, east by Idaho, south by Oregon, and west by the Pacific Ocean. The length from east to west is 350 miles and the extreme breadth is 225 miles. It has an area of 69,180 square miles, which includes 2,300 square miles of water surface.

DESCRIPTION. The Cascade Mountains divide the State into two sections, which differ widely in climatic and surface condition. The eastern section comprises about two-thirds of the State and is formed largely of grazing lands. This region is a treeless plain, with an elevation of 1,000 to 2,000 feet above the sea, and is characterized by more or less dry cañons and hilly tracts along the larger streams. In the western part the surface is mountainous, but the rainfall is greater than in the eastern part, and the climatic conditions are more favorable to the growth of vegetation. Gray's Harbor is the chief inlet from the Pacific, while Puget Sound, a beautiful sheet of water, extends inland from the straits of Georgia and Juan de Fuca. Numerous fertile islands lie off the shore, both in the Pacific and in the straits toward the northwest, most of the latter being included in San Juan County. Within Washington the Cascade Mountains have a general elevation of 8,000 feet. In two places they are broken by passes, known as Stampede Pass and Steven's Pass, through the former of which passes the line of the Northern Pacific Railway and through the latter, that of the Great Northern Railway. Among the highest elevations are Mount Baker, 10,827 feet; Mount Adams, 12,470 feet; and Mount Rainier (Tacoma), 14,526 feet. A range of the Cascades, known as the Olympic Mountains, stretches from the Strait of Juan de Fuca toward the south, whose highest peak, Mount Olympus, has an elevation of 8,150 feet. This range stretches southward into Oregon and is cut from the southern end of the Puget Sound valley by the valley of the Chehalis River, which has its outlet in Gray's Harbor.

Washington lies almost entirely within the basin of the Columbia, which crosses the northern border from the Dominion, flows through the eastern part of the State, and forms most of the southern boundary. The Clark Fork crosses the border from Idaho, but joins the Columbia after passing through the northeastern corner into Columbia. A part of the western border is formed by the Snake, which flows through the southeastern corner and joins the Columbia at Ainsworth. The Spokane River enters the State from Idaho, passes the city of Spokane, and joins the Columbia at Fort Spokane. Other tributaries within the State include the Charles, the Okanogan, the Wenatachee, the Yakima, the Cowlitz, and the Lewis rivers. The northwestern part of the State is drained chiefly by Puget Sound, which receives the inflow from the Skagit, the Nesqually, the White, and the Puyallup rivers. Numerous lakes of considerable size are located within the State, most of them in the mountainous region. They include Lake Chelan, Washington (connected by canal

with Puget Sound), Moses, Big Swamp, and Queniult. Throughout the mountains are forests of valuable timber, such as spruce, red and white cedar, red and yellow fir, oak, ash, alder, larch, and hemlock.

The climate in the eastern part is quite dry, owing to the fact that the greater part of the moisture is condensed by the Cascade Range before it reaches the plains. Here the mean temperature for January is 30° and for July 74°, but the extremes range from 30° below zero to 110° above. Western Washington has an equable climate, with a mean temperature of 40° in January and 62° in July. The extremes in this section range from 10° in winter to 95° in summer. The rainfall in the western part is excessive, being 132 inches on the Pacific coast, and about 50 inches at Olympia. In some places on the coast the rainfall reaches 140 inches and the precipitation is confined chiefly to the winter months. Eastern Washington has a rainfall of from 14 to 16 inches. In the Great Plains of the Columbia River the rainfall sometimes is as low as 10 inches. The climate is singularly healthful.



WASHINGTON.

1, Olympia; 2, Seattle; 3, Tacoma; 4, Spokane; 5, Bellingham; 6, Walla Walla; 7, Everett. Dotted lines indicate principal railroads.

Mining. Washington is rich in mineral deposits. Extensive coal fields are found in the east central part and the basin of Puget Sound, and it is the leading coal-producing State of the Pacific coast. The annual output of this mineral is reported at 3,575,000 short tons, and the larger part of the product is obtained from King, Pierce, and Kittitas counties. Gold and silver are mined in the mountains. Granite, limestone, sandstone, and clays are obtained in abundance for manufacturing and constructive purposes. Other minerals include copper, lead, iron, tellurium, arsenic, platinum, slate, and antimony. Mineral waters with curative properties are found in many sections of the mountains.

Agriculture. About 25 per cent. of the total area is included in farms, which average 256 acres. A large variety of crops are grown, since the soil has elements of fertility suitable for general farming. Irrigation is carried on extensively in the eastern part, but wheat can be grown successfully in many sections without artificial watering. The rainfall during winter is usually sufficient to supply moisture for the growing crop. Wheat exceeds in acreage all other cereals combined and the quality is of a high class. A large section of country between the Cascade and the Olympic mountains is well adapted to all classes of farming. Among the leading crops beside wheat are oats, barley, hay, potatoes, sugar beets, hops, rye, and fruits. Irrigation is carried on most extensively in the valleys of the Yakima and the Columbia.

The eastern part of the State, though located in the arid region, has large stretches of country that are well grassed, and rich grazing lands are likewise found on eastern slopes of the Cascades. This has given rise to large livestock interests. Cattle are grown extensively for meat and dairying and choice breeds of horses are reared. There has been a constant increase in the number of sheep and the clip of wool. Other domestic animals include swine, mules, goats, and poultry.

Manufactures. The State has an abundance of raw material to promote manufacturing enterprises, especially timber, coal, stone, and agricultural products. The fisheries yield products annually which are valued at about $6,800,000. Vast quantities of fish are canned and cured for the market, especially the salmon, blue back, halibut, cod, smelt, and oysters. Large interests are vested in flour and grist milling, slaughtering and meat packing, the manufacture of lumber and timber products, and the output of cheese and other products obtained from the dairy. The general manufactures include machinery, earthenware, clothing, canned and dried fruits, ships, furniture, hardware, cigars, beet sugar, and paper and wood pulp. Seattle, Tacoma, Spokane, and Bellingham are the chief manufacturing centers.

Transportation. The Snake and Columbia rivers and Puget Sound furnish facilities for inland communication. Puget Sound is suitable for the largest seagoing vessels as far as Seattle and ships of medium size sail as far south as Tacoma. The entire coast line, including the inlets, has an extent of 2,000 miles. Three trunk lines traverse the State from west to east, the Great Northern, the Northern Pacific, and the Chicago, Milwaukee and Saint Paul railways. Other lines include the Canadian Pacific and several others. Electric railways are operated through some parts of the State, especially in the western section. A large trade with foreign countries is carried through ports on Puget Sound, Gray's Harbor, and Willapa Harbor, from which regular liners sail to European and

Asiatic countries. The chief exports include coal, lumber, canned fish, cereals, and live stock.

GOVERNMENT. The constitution was adopted when the State was admitted, in 1889. It vests the executive authority in the governor, lieutenant governor, secretary of State, treasurer, auditor, attorney-general, commissioner of public lands, and superintendent of public instruction, each elected for four years. Legislative authority is vested in the General Assembly, which consists of a senate and a house of representatives. Membership in the latter is limited between 63 and 99 members, while the senators cannot number less than one-third nor more than one-half of the number of representatives. Sessions of the General Assembly are held biennially. A supreme court of five judges, elected for six years, has the highest judicial authority. Superior courts are maintained in the counties. Local government is administered by towns, municipalities, and counties.

EDUCATION. The schools are supervised by a State superintendent of public instruction, who is elected for four years and is assisted by a board of education, which is appointed by the Governor with the consent of the senate. All the public schools are required to have not less than three months of school during the year, but the average time the schools are in session is 140 days, which is exceeded only by a few of the states. Based on the school population, the rate of illiteracy is 3.1 per cent. The rural schools are organized on the district plan, being supervised by a county superintendent, and the towns and cities maintain graded schools. A permanent school fund yields a part of the revenue for the support of public instruction, but the principal income is derived from State and local taxes. Normal schools for the instruction of teachers are situated at Cheney, Bellingham, and Ellensburg, but normal training is likewise given in several colleges and a number of public high schools.

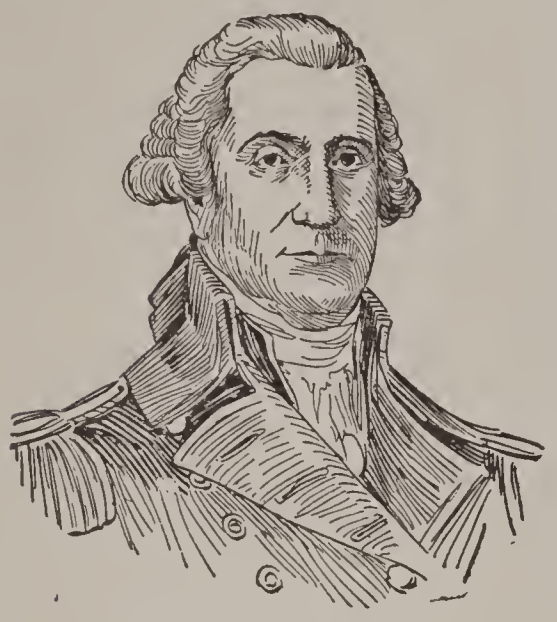
The State University of Washington, situated at Seattle, is at the head of public instruction. Other institutions of higher learning include the Washington Agricultural College and School of Science, at Pullman; the Whitman College, at Walla Walla; and the Gonzaga College, at Spokane. Chehalis is the seat of an industrial school, Walla Walla has the penitentiary, and Vancouver is the seat of a home for the feeble-minded. The hospitals for the insane are located at Medical Lake and Fort Steilason. Orting is the seat of a soldiers' home. A State board of control has general charge of the charitable and penal institutions.

INHABITANTS. The inhabitants include 111,364 persons of foreign birth, who consist chiefly of Canadians, Germans, and immigrants from Great Britain. Olympia, in the western part of the State, is the capital. Other cities include Seattle, Spokane, Tacoma, Bellingham, Walla Walla, and Everett. In 1900 the State had a population of 518,103. In 1920 the total colored population was 36,844, of which 6,883 were Negroes, 2,363 Chinese, 17,387 Japanese, and 9,061 Indians. Population, 1920, 1,356,316.

HISTORY. The region now included in Washington was discovered by Juan de Fuca, a Greek sailor in the service of Spain, in 1592, and his name has been given to the strait south of Vancouver Island. Boston merchants sent an expedition to explore the Columbia and establish trade with the Indians, in 1789, and another expedition for the same purpose was organized by John Jacob Astor in 1810. Lewis and Clark visited the region in 1805 by crossing the Rocky Mountains and spent the winter on the Pacific coast. England claimed a part of the region, but in 1846 recognized the claims of the United States to all of the Oregon country. The first permanent settlement was made at Tumwater in 1845 and the Territory was organized in 1853. Rapid settlement of the region, stimulated by the extensive natural resources and the building of railroads, led to the admission of Washington as a State in 1889. Thousands of tourists from all parts of the continent visited the State in 1909, being attracted by the Alaska-Yukon Exposition, which was held on the ground of the University of Washington, in Seattle.

WASHINGTON, Booker Taliaferro, educator, born a slave at Hale Ford, Va., April 18, 1858; died Nov. 14, 1915. The presumption is that his father was a white man. His mother removed to Malden, W. Va., shortly after the emancipation, and he attended school in the winter months and worked during the summer in the salt and coal mines. In 1871 he went to Hampton, Va., where he became a student in the Hampton Institute for colored boys. Though greatly limited by poverty in his effort to secure an education, he made rapid advancement in his studies, and in 1875 graduated from the institution with the highest class honors. He attended Wayland Seminary, Washington, D. C., a short time, but soon after began to teach at Hampton, and in 1881 was placed in charge of the Tuskegee Institute (q. v.). The institution at that time consisted of a few very poor buildings, but was supported by an annual appropriation of $2,000 from the State of Alabama. By heroic efforts and undaunted perseverance he converted that institute into the most famous center of learning and industrial life devoted to the education of Negroes in the world. He is in demand as a lecturer on economic and educational questions, being an entertaining, thoughtful, and scholarly speaker. Many of his writings have been published in current magazines. In 1900 he published "The Story of My Life," which contains a highly interesting account of his life. He wrote "Character Building," "Working with the Hands," "Up from Slavery," and "The Future of the American Negro."

WASHINGTON, George, first President of the United States, born in Westmoreland County, Virginia, Feb. 22, 1732; died at Mount Vernon, Dec. 14, 1799. His grandfather, Lawrence Washington, came from England to Virginia in 1657 and settled at Bridge Creek, on the Potomac River, where his father, Augustine Washington, died in 1743. George was the eldest child by the second wife of the latter, Mary Ball, and the primitive condition of the country made it possible for him to acquire only a limited education in elementary subjects. He was of a studious disposition, which enabled him to attain a considerable knowledge of mathematics and surveying, and ultimately he adopted the profession of a surveyor. In 1751 he was appointed adjutant general of one of the districts of Virginia, with the rank of major. He was sent by Lieutenant-Governor Dinwiddie, of Virginia, in 1753, on important business to the French army in the Ohio valley. When the war broke out the following year, he was promoted to the rank of lieutenant colonel, and in 1755 acted as aid-de-camp to General Braddock.



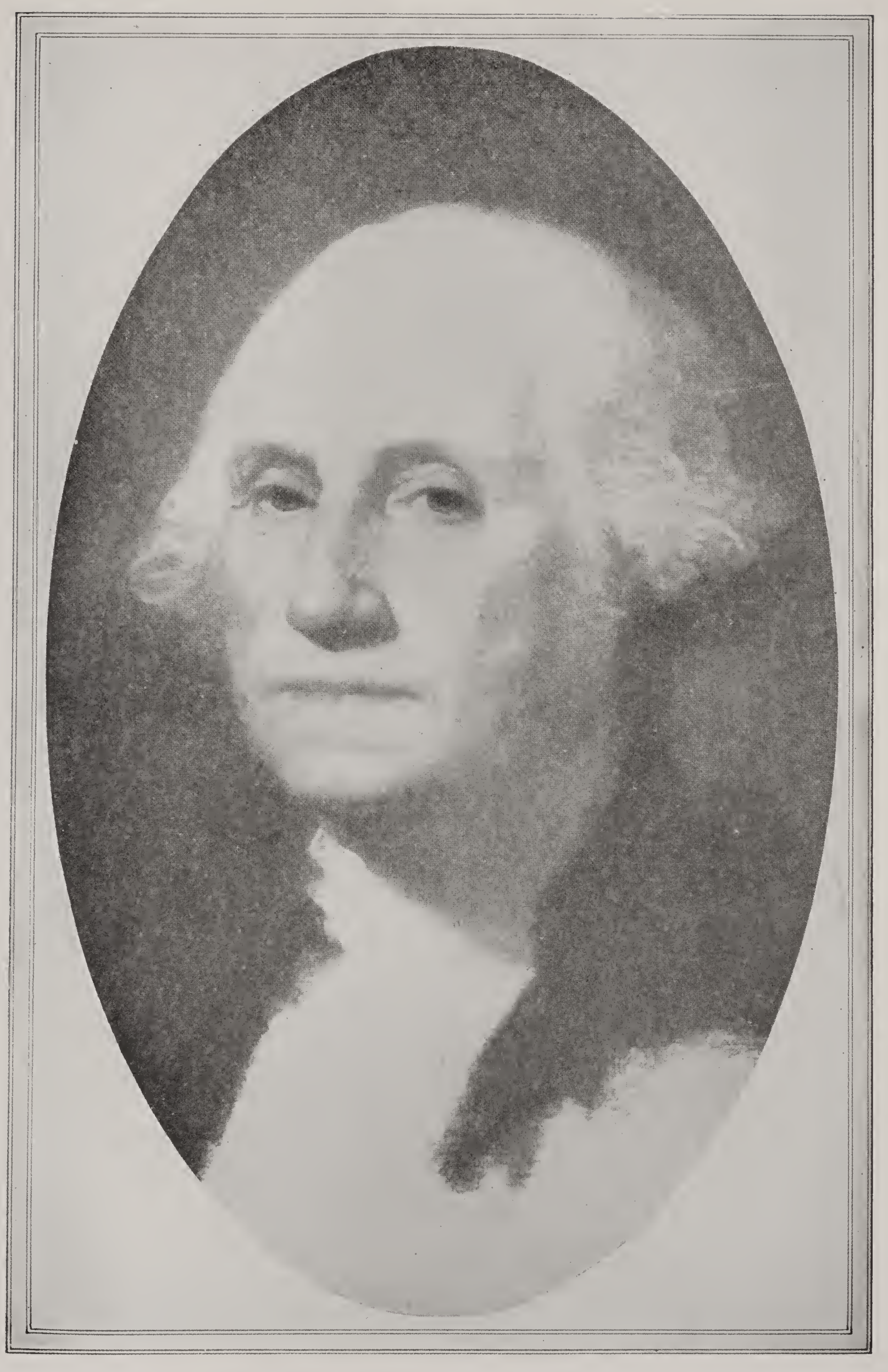
GEORGE WASHINGTON.

Washington had all the qualities needed to make a successful commander and at the Battle of Fort Duquesne, occupying the present site of Pittsburg, he showed remarkable mastery of military tactics. Though many of the officers in that battle were slain or wounded, Washington returned safely from the disastrous expedition, but in the contest had two horses shot under him. He left the army at the close of the war and on Jan. 17, 1759, married Martha Custis, a rich widow of Virginia, the former wife of John Parke Custis. Shortly after he removed to Mount Vernon, that estate having been given to him by his brother, Lawrence. For sixteen years he led the life of a planter, at Mount Vernon, and on his large estate kept many slaves, a total of 125, who were emancipated by his will at the death of his wife. In the meantime he served as a magistrate or as a member of the Legislature, and was a delegate to the First and Second Continental congresses. The Second Continental Congress appointed him commander in chief of the army, on June 17, 1775, and he hastened to Cambridge, Mass., where he took command of the army under the historic elm on July 3. His first military reform was to reorganize the raw and ill-equipped troops, and his early successes caused the British to evacuate Boston in the early part of 1776.

The first half of the year following the adoption of the Declaration of Independence was discouraging to the Americans, but Washington's brilliant surprise of Trenton and the victory at Princeton suddenly raised the courage of those who supported the Continentals. He continued as commander in chief of the armies throughout the war of independence, and, although disaffection, defeats, and lack of supplies disheartened others, he remained firm and persevering. When victory and peace finally crowned the efforts put forth by the Americans, in 1783, he retired to private life at Mount Vernon. Washington was a delegate to and president of the national convention which met in Philadelphia, Pa., in 1787, and adopted the Constitution. He was the unanimous choice for President and was inaugurated at New York, April 30, 1789, and at the end of his first term was unanimously reëlected. On March 4, 1797, he retired to private life, having declined a third election to the Presidency.

Washington selected Jefferson as Secretary of State; Knox, of War; Hamilton, of the Treasury; and Randolph, Attorney-General. In 1793 he issued a neutrality proclamation and made tours to the north and south, and in 1796 issued his famous Farewell Address to the people. When a war was threatened between France and the United States, in 1798, he was again appointed to the chief command of the army of the United States, with the rank of lieutenant general, but died soon after at Mount Vernon. Washington had no children, but adopted two grandchildren of his wife. He was a man of remarkable self-control and dignified appearance, being six feet two inches tall, and in public matters towered above party strife. He was a Freemason and served as master of his lodge. Congress adopted resolutions at the time of his death, their passage being moved by John Marshall, and in them occur the following words: "First in war, first in peace, and first in the hearts of his countrymen." His home at Mount Vernon, about sixteen miles below Washington, became property of the Federal government in 1858. Many monuments have been reared to commemorate the notable events of his life.

Washington rightfully has a preëminent position among the warriors and statesmen of America. He possessed in a large measure the faculty of selecting strong men as advisers and coworkers, such as General Greene, Marquis de Lafayette, Baron von Steuben, Thomas Jefferson, and Alexander Hamilton. Among the notable events which transpired within his time are the French and Indian wars, the American Revolution, and the establishment of the United States of America. His administration as President witnessed the admission of Kentucky, Vermont, and Tennessee; the Federal assumption of



(Art. Washington)

GILBERT STUART'S PORTRAIT OF GEORGE WASHINGTON.

the debts contracted by the several states during the Revolution; the Indian wars in the Northwest Territory; the establishment of the first Bank of the United States; the founding of the City of Washington; the Whisky Insurrection; the establishment of the national mint in Philadelphia; and the conclusion of important treaties with European countries, notably England and France.

WASHINGTON, Martha, wife of George Washington, born in New Kent County, Virginia, May, 1732; died at Mount Vernon, May 22, 1802. She was a daughter of John Dandridge, a planter of Virginia, who held the rank of colonel. In 1749 she married John Parke Custis, a wealthy planter, and soon after removed to the region of the Pamunkey River. Two of their four children died in infancy and Custis died in 1757, leaving his widow a valuable estate. She met George Washington about a year after and in 1758 made a marriage engagement with him, but the ceremony was not performed until in 1759, owing to the circumstance that Colonel Washington was absent on his campaign in the north. The life of Mrs. Washington at Mount Vernon was quite similar in style to that of the English aristocracy. She took pleasure in entertaining, was a good housekeeper, and was in close sympathy with the military and political measures of her husband. However, the latter was not privileged to enjoy his home during the long war for independence, visiting Mount Vernon only twice within the period of the Revolution, but she accompanied him to New York and Philadelphia, and rendered personal assistance during the long winter at Valley Forge. It is said of her that she "was busy from morning till night providing comforts for the sick soldiers."

She was simple in attire, dressed in garments that were spun and woven at Mount Vernon, and wore her hair grouped under a plain cap. Her general dislike for official life caused her to remain at her home much of the time, and she was much pleased when her husband refused the office of President after serving two terms. The remainder of her life was spent at Mount Vernon, where she took delight in discharging domestic duties and in entertaining the large number of visitors who came as guests of her husband. She had many letters from Washington, both before and after their marriage, but these she destroyed before her death, preferring that the confidence shared by them should not be made public. Her death occurred about two and a half years after that of her husband.

WASHINGTON, Treaty of, a treaty concluded at Washington, D. C., in 1871, between Great Britain and the United Staes. It had for its object the settlement of various differences between the two governments, the chief of which was the dispute in regard to the Alabama Claims. The commission consisted of five representatives of the United States, headed by Hamilton Fish and E. R. Hoar, and five representatives of Great Britain, headed by Earl de Gray and Sir John MacDonald. The first session convened on May 8 and 34 meetings were held, after which the treaty was proclaimed in force on July 4. Geneva, Switzerland, was selected as the place of meeting. Besides adjusting the Alabama Claims, the commissioners declared certain rules regarding neutrality in war, settled claims of British subjects against the United States, adjusted some differences in regard to fisheries, and submitted for arbitration to the Emperor of Germany the northwestern boundary dispute. See **Geneva Award.**

WASHINGTON, University of, a State institution of higher learning founded at Seattle, Wash., in 1861. In the early history of the institution it ranked only as an academy and the first class did not graduate until in 1876. The departments include the College of Liberal Arts, the Graduate School, the College of Engineering, and the schools of Mines, Pharmacy, and Law. It has grounds which cover 355 acres and the value of the property is about $2,150,000. The faculty includes 210 teachers and professors and the library contains 85,000 volumes. About 4,750 students attend annually.

WASHINGTON AND LEE UNIVERSITY, an educational institution at Lexington, Va. It had its beginning in 1749, when Robert Alexander established the Augusta Academy, which was removed to Lexington in 1792. The name was changed to Washington University in 1798, when General Washington made a donation of some funds, and its present name was adopted in honor of Gen. Robert E. Lee, who became its president after the Civil War. The institution has courses in classics, sciences, law, literature, and engineering. It has about 45 instructors, 475 students, and a library of 55,000 volumes. The endowments amount to $875,000 and the property is valued at $500,000. It is the burial place of Robert E. Lee and his resting place is marked by a statue.

WASHINGTON ARCH, a memorial erected in New York City to commemorate the first inauguration of George Washington as President of the United States. It was designed by Stanford White, an architect of New York, and is located at the foot of Fifth Avenue. The structure is 62 feet wide and 77 feet high, and the archway is 30 feet wide and 47 feet high. It is constructed of marble. A popular subscription was raised to defray the expense, which was $128,000.

WASHINGTON COURT HOUSE, a city of Ohio, county seat of Fayette County, 75 miles northeast of Cincinnati. It is situated on Paint Creek and on the Baltimore and Ohio, the Ohio Southern, and other railways. Among the noteworthy buildings are the high school, the public

library, several fine churches, and the county buildings. It has manufactures of flour, boots and shoes, woolen goods, and machinery. Electric lighting, sewerage, and waterworks are among the municipal facilities. The surrounding country is agricultural and stock raising. Population, 1900, 5,751; in 1920, 7,962.

WASHINGTON ELM, the name given to an elm in Cambridge, Mass., situated near the northwestern corner of the Common. It is celebrated because Washington stood under this tree at the time he assumed command of the American army, on July 3, 1775. Although it is protected against injury, the tree is decaying quite rapidly.

WASHINGTON MONUMENT, a celebrated obelisk in Washington, D. C., erected to the memory of George Washington. A popular movement for a national memorial began before the death of Washington and he expressed his own preference for the site, which is on a mound at the west end of the Mall and due south of the Executive Grounds. The monument is 555 feet high, with an elevator and an iron stairway of 900 steps within, which affords access to the base of the apex. The shaft is 55 feet square at the base, where the lower walls are 15 feet thick, but at an elevation of 500 feet, where the pyramidal top begins, the walls are 18 inches thick and about 35 feet square. The construction of the outer walls is of white marble blocks, which were cut in the most careful manner, and the inside walls are of blue granite, but the two parts of masonry are closely connected. A plumb line suspended from the top of the monument inside shows that the deflection from the perpendicular is less than three-eighths of an inch. Many of the large stones of the inside walls are marked, indicating that they were contributed by particular states or societies. Construction work began in 1848, when the corner stone was laid, and the monument was dedicated on Feb. 22, 1895, the anniversary of Washington's birthday. The entire cost was $1,187,710. No ornamentation or inscription marks the obelisk, which is looked upon as a monument to the American people in the name of their foremost representative.

WASHINGTON UNIVERSITY, a coeducational institution of higher learning at Saint Louis, Mo., chartered as Eliot Seminary in 1853. It was so named in honor of Rev. Eliot of that city, but in deference to his wishes the name was changed in 1854 to Washington Institute. Three years later, by an amendment to the charter, the institution became Washington University. The charter was to be perpetual and was of the most liberal character, the only limitations being those forbidding any sectarian or partisan instruction. An evening school for boys was opened in 1854 and soon a day school was begun, the forerunner of the present Smith Academy, a preparatory school of the university. The college was organized in 1858 and the first degrees were granted in 1862. A building for the college was erected in 1858, to which a wing was added and which now forms the home for the School of Engineering and Architecture. The Saint Louis Medical College was made a department of the university in 1891, to which was united, in 1899, the Missouri Medical School, thus forming by the union the present medical department. Mary Institute, a school for girls, was organized in 1858 and the Manual Training School was established in 1879.

In 1894 a tract of land was purchased northwest of Forest Park. This tract now includes 115 acres. Upon this commanding site twelve fireproof, handsome buildings have been erected. The endowment funds have been so largely increased as to afford excellent opportunities for the pursuit of all branches of study. Degrees issued by the institution are held in high esteem, and their holders are admitted without examination to graduate schools of the highest standings. The general and professional libraries are ample and the technical laboratories are supplied with the best modern apparatus. It has ample dormitory facilities and affords splended opportunities for physical training under competent direction. The institution recently entered upon the beginning of a second half-century of work with full confidence in its future. It has 190 instructors and an average enrollment of about 2,200 students.

WASHITA (wŏsh'ĭ-tạ), or **Ouachita,** a river of the United States, which rises near the western boundary of Arkansas and has a general course toward the southeast. It has a length of 550 miles, two-thirds of which are navigable, and it joins the Red River at the southeast corner of Catahoula County, La. The chief tributaries are the Little Missouri, Saline, and Tensas rivers.

WASP (wŏsp), a genus of insects which somewhat resemble bees. They differ from bees mainly in that they have a more powerful sting, the body is less bulky, and in that they are not useful for the production of wax and honey. They are divided into two general classes, the social wasps and the solitary wasps. The *solitary wasps* build small nests in the ground, or construct them of pasty material on trees or walls, and divide them



NESTS OF WASPS.

into two or three cells. These cells are partly filled with food, usually with caterpillars and other insects paralyzed by being stung, and afterward the food is consumed by the larvae. *Social wasps* live in communities and include males, females, and neuters or workers. The neuters and females have a venomous sting, quite similar to the sting of a hornet. Most species construct a papery nest of masticated vegetable materials, which they suspend from the branches of trees. These nests are walled peculiarly to prevent the entrance of moisture and within is a large chamber, which is reached by a tortuous gallery or passage.

In cold climates most of the adult wasps die in the winter, only a few females surviving, but a new brood is soon produced from eggs laid in the spring. Each of the surviving females finds a separate location in which to lay the eggs, thus giving rise to several distinct communities, all of them constructing new nests, instead of utilizing the old ones. Some families have 150 to 300 wasps, but in tropical countries the nests are frequently from five to six feet long and contain 15,000 to 25,000 wasps. They feed on the sweets of flowers and fruits and on insects, killing the latter with their jaws. Many species have been described, ranging from the smaller forms common to colder regions to the large tropical species. Several species of wasps native to Brazil resemble the bees in that they store honey. Insects of this genus are quite like bees in that they are infested by a class of hymenopterous parasites, which deposit their eggs in the bodies, the young living in the region of the back.

WATAUGA ASSOCIATION (wä-tą′gȧ), an organization associated with the history of the United States, organized in 1769 to settle the territory now comprised in the State of Tennessee. It organized a scheme of government for the settlement, which consisted of a legislative council of thirteen members, who were elected by the signers of the articles upon which the government was based. Five of the councilors had general executive authority and they chose one of their own members as supreme chairman. Many outlaws and adventurers took up their residence in the settlement, but they were not subject to the government of the association, hence the scheme did not prove satisfactory. The region became known as Washington District and in 1876 the representatives were given seats in the assembly of North Carolina.

WATCH, an instrument for keeping and indicating time, usually inclosed in a rounded case so it may be carried in the pocket. The first watch was made at Nuremberg, Germany, in 1477, but the early watches had but one hand and required winding twice a day. There is a considerable similarity between a watch and a clock, each having a train of wheels, which is moved and controlled by some form of mechanism. In the watch the mainspring, whose elastic force produces the motion of the whole machinery, takes the place of the weight in the clock. The mainspring, a spiral made of steel, is wound in a cylindrical barrel, and in unwinding moves the barrel in such a manner that motion is carried from one wheel to another by means of cogs and pinions. When wound up by turning the watch key, the mainspring acts upon the wheels exactly as does the weight of a clock, and, to prevent the watch from running down and to make the wheels move with uniform motion, the balance wheel and hairspring have been introduced, which take the place of the pendulum of a clock. The balance wheel and the hairspring act upon the escapement (q. v.), a variously designed mechanism that serves to gauge the movement, just as the scapewheel of the clock is acted on by the pendulum. The time-keeping qualities of a watch depend largely upon the perfection of the escapement.

Many widely different sizes and kinds of watches are in use. They are variously constructed with either the lever, the horizontal, or the chronometer escapement. Watches having the chronometer escapement are of the highest attainable precision, being rendered independent of variation in temperature by a compensation balance wheel and an especially delicate and effective escapement. Those used to determine the longitude of a ship at sea are set in gimbals, whereby they remain level. They usually beat half-seconds. Watches of the cheaper class are now made principally by machinery, the different parts being made so as to be interchangeable, thus enabling the watch repairer to replace with an exact duplicate any part that becomes unfit for service. Many improvements were made in the last century, such as the addition of hands to indicate minutes and seconds and the mechanism for winding the watch and setting it by turning the stem instead of a key. Watches were made mostly in France, Germany, and Switzerland up to within the last fifty years, but now extensive establishments are maintained in many cities of Canada and the United States. The largest watch manufacturing establishments in the United States are at Boston and Waltham, Mass., and Elgin, Ill.

WATER (wą′tẽr), a substance formed by the combination of oxygen and hydrogen, in the proportion, by volume, of one part oxygen to two parts hydrogen; or, by weight, of eight parts oxygen to one part hydrogen. It was classed as an element until 1773, when Lavoisier, a French chemist, discovered that it is a compound substance. Like the gases of which it is formed, pure water has neither taste nor smell. Although colorless in small quantities, it has a deep-blue color when in large masses. It is slightly compressible and a powerful refractor of light, but is not a good conductor of heat and electricity. At a temperature of 32° Fahr., it freezes and

forms ice, or snow, and boils at 212° under a pressure of 29.9 inches of mercury. Water is widely diffused in nature, covering three-fourths of the surface of the earth and constituting a large per cent. of all animal and vegetable life. It is widely distributed in the air as vapor and comprises a large part of many mineral substances. Water constitutes about seven-eighths of the human body. Though widely diffused in nature, we meet with it only in the impure form and are able to obtain it in a pure state only by distillation, that is, by boiling it in a retort and condensing the steam.

Rain water is the purest kind obtainable, since it results from vapor taken up from the surface of the earth, but even that is rendered slightly impure by smoke, dust, and various gases contained in the air. The atmospheric waters, whether in the form of rain, hail, or snow, are quite free from foreign substances, but when they sink through the porous strata of the earth and reappear as spring or river waters they are always charged, more or less, with various salts taken up from the earth. These substances embrace gypsum, iron, salt, lime, sulphur, and many others. When the proportion of minerals is small, the water is said to be *soft* and, when the proportion is large, it is called *hard water.* Mineral waters are those containing sufficient mineral substances to make them of value for medical or commercial purposes, such as are derived from siliceous, calcareous, sulphurous, or salt springs.

The weight of a given quantity of water depends upon its temperature. This is due to the circumstance that water contracts and becomes denser in cooling, though it is not the heaviest when reduced to the coldest point. It is at its maximum density when the temperature is 7.2° warmer than the freezing point, or at 39.2° Fahr. When warmed to a higher degree of temperature it becomes lighter, until at 212° it passes off in steam; and, when reduced to a lower temperature, it becomes lighter until it freezes at 32°, thus accounting for the circumstance that ice will float on the surface of water.

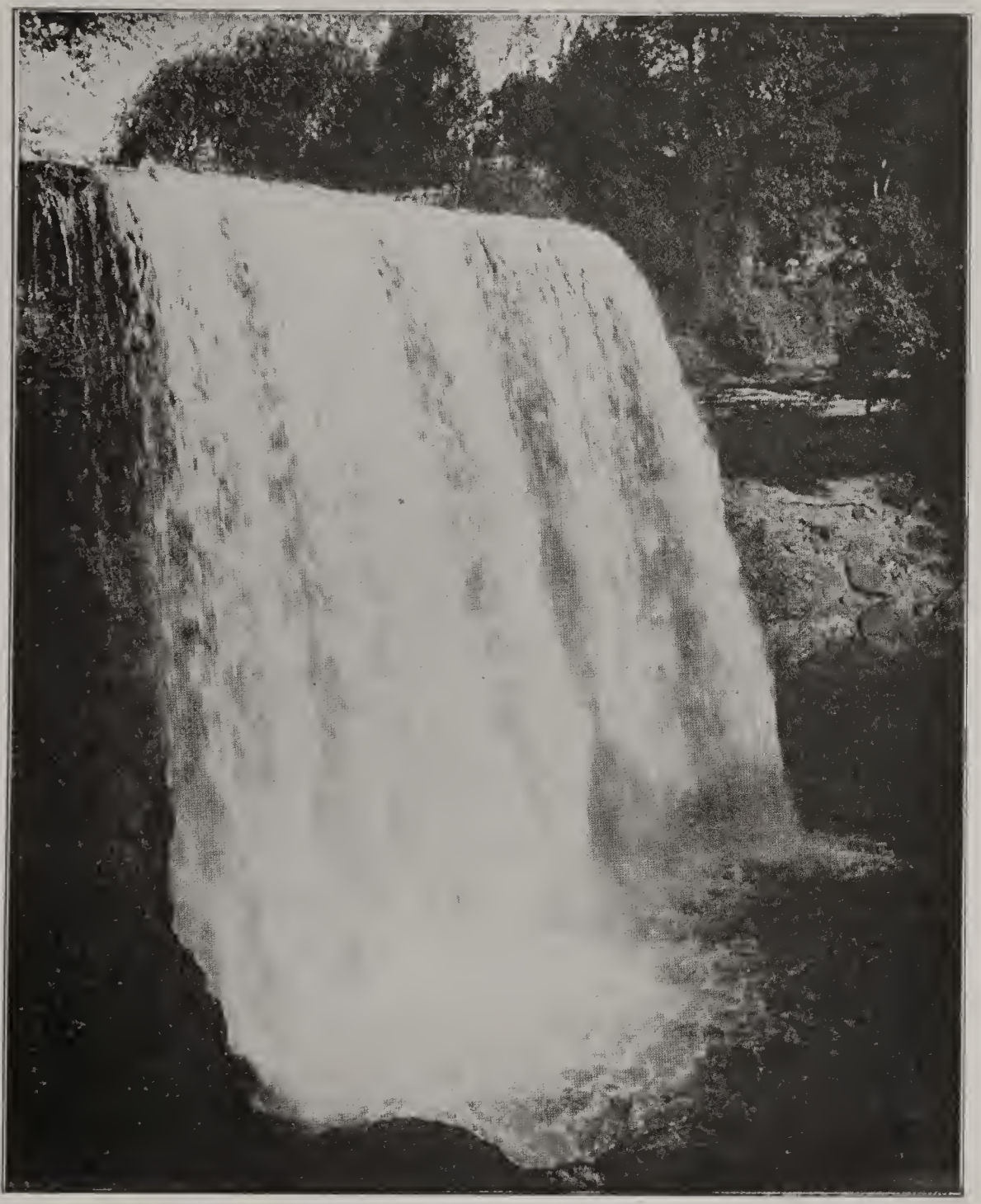
It may be said that the ocean is the great reservoir for the supply of water. Evaporation conveys a constant supply from the surface of the sea into the atmosphere, where it is carried by the winds to different parts until it finally falls to the surface in the form of dew, frost, snow, or rain. Thus all plant and animal life is quickened, springs are formed, rills meander into the valleys and form streams, lakes and rivers are replenished, and finally the water again finds its way back to the ocean. Though the water of the ocean is salty, the saline matters are not taken up as the vapor rises. For this reason the growing plants are watered by nature pouring upon them the practically pure form. Besides watering the plants rains tend to purify the air and the surface of the earth by washing foreign substances along with them.

Water exercises a continuous influence upon the surface of the land in that it softens the ground and carries many substances with it as it flows down the hills and valleys in the form of streams or glaciers. We see evidences of this in the channels of streams being cut deeper in some regions, while in others vast deposits of earth are made in the forms of river deltas and banks. Since water is absolutely necessary to life, it is quite important that it should be sought in its purest form. A cubic foot of fresh water weighs 62.32 pounds and is equal to 7.48 gallons. One gallon weighs 8.33 pounds. See **Hygiene; Ice; Steam; Waterworks.**

WATER BUG, the general name of any insect which lives almost entirely in water and feeds on other aquatic insects. Nearly all of these insects are active and effect movement in the water by means of oarlike hind legs. The color is brownish, the first pair of wings is horny, and the antennae are small. The head is small and the fore limbs are prehensile. They include the *water-boatman,* the *back-swimmers,* the *marsh-treaders,* the *water-striders,* and the *creeping water bugs.* These names indicate somewhat their habits of moving from place to place. Several allied species of insects are known as *water scorpions.* They are quite large, some species being two to three inches long, and are frequently seen flying about at night in search of food. In habits they are voracious and carnivorous. Two long filaments extend from the caudal extremity, through which respiration is effected.

WATERBURY (wạt'ẽr-bĕr-ĭ), a city of Connecticut, in New Haven County, on the Naugatuck River, 32 miles southwest of Hartford. It is on the New York, New Haven and Hartford Railroad and is surrounded by a fertile farming and dairying country, which produces cereals, fruits, and grasses. The noteworthy buildings include the Bronson Public Library, the Masonic Temple, the Waterbury Hospital, the Gerard School, the Convent of Notre Dame, and the Saint Margaret's Diocesan School. It has a fine soldiers' monument and a commodious city hall. The streets are lighted with gas and electricity. They are improved substantially by pavements, public parks, and an extensive street railway system. Among the chief manufactures are the Waterbury watches, a class of timekeepers used very extensively. Other products include buttons, edged instruments, silver-plated ware, carriages, boots and shoes, brass and metal goods, ironware, wearing apparel, and machinery. The region was settled in 1667, and the city was incorporated in 1853. Population, 1900, 45,859; in 1920, 91,419.

WATER COLORS, the general name of pigments used in painting, which are mixed with water and some adhesive, as size or gum, instead of oil. Colors of this class are prepared in various ways to suit the method of application. Those employed in coloring walls and



(Art. Waterfall)
MINNEHAHA FALLS, ON MINNEHAHA CREEK, AT MINNEAPOLIS, MINN.

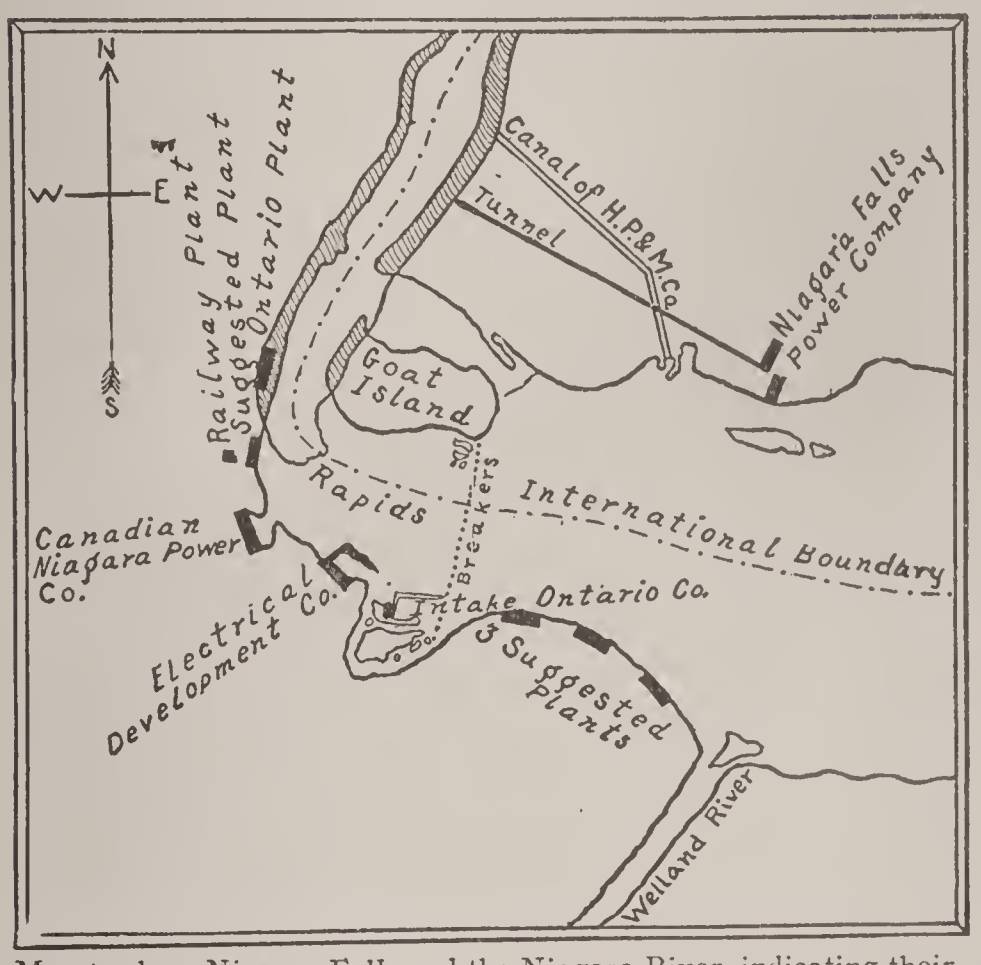


KANAKA FALLS, ON KANAKA CREEK, NEAR MAPLE RIDGE, B. C.

similar surfaces are mixed with size or glue, while those used in painting pictures are made in the form of small cakes. In painting with water colors the artist has a number of small brushes and several cakes of different colors, and secures advantage from the fact that the product is not only clearer, but dries more rapidly than painting in oil. Among the colors used chiefly are indigo, gamboge, cobalt blue, lake, carmine, vermilion, burnt ocher, pink reds, and ultramarine. They are usually mixed with water alone, but gum and other substances are sometimes added to the water, in order to give depth to the shadows and brilliancy to the lights.

WATERFALL, or **Cataract**, a descent of the water of a river or stream over a precipice or down a steep incline. Waterfalls occur most frequently in mountainous countries, where the streams from the mountain sides enter the valleys. They are due to the occurrence of breaks in the channels of streams, the water falling from the upper to the lower level. Rocky channels and sides are necessary to form an enduring waterfall, otherwise the break in the channel is soon worn down to a common slope. In most cases the volume of water is comparatively insignificant, but in some instances the fall is very great and the phenomenon is correspondingly grand. Yosemite Falls of California are the highest in the world, falling 2,660 feet by three plunges.

The Oroco Falls, in Monte Rosa, have a descent of 2,400 feet. Next to these are the Roraima Falls, Guiana, which bound 2,000 feet in two plunges. Niagara Falls, height 167 feet, the largest in the Western Hemisphere, are in the Niagara River, the outlet of the Great Lakes.

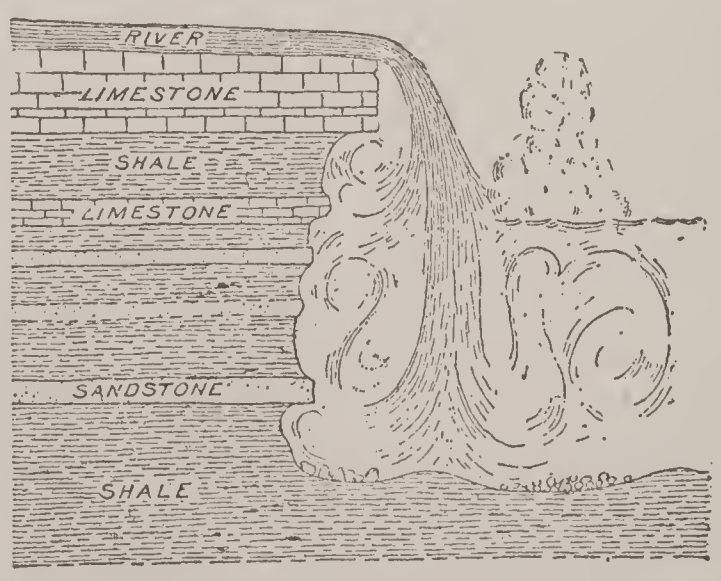


Map to show Niagara Falls and the Niagara River, indicating their use for water power.

These falls are of much importance for the power obtained for manufacturing and other industrial purposes. Other noted falls include the Grand Falls, Labrador, 2,000 feet; Sutherland Falls, New Zealand, 1,900 feet; Staubbach Falls, Switzerland, 925 feet; Victoria Falls, Zambezi, 400 feet; and Hay River Falls, Alaska, 22 feet.

Waterfalls constantly recede, the rate depending upon the hardness of the rock. The causes of this action may be seen in the illustration, which gives a view of the different strata of earth which usually compose the ledges over which the water descends. It will be observed that the direct action of the water is greatly aided in the erosion by reaction after the main current strikes the bottom. It is estimated that Niagara Falls recedes up the stream one foot per year. Some of the waterfalls present splendid scenery and are regarded among the most pleasing natural phenomena. This is true of the Yosemite Falls, which rivals the most beautiful scenic region in the world. The most noted cascade of the Mississippi valley is formed by the Falls of Minnehaha, near Minneapolis, Minn. It was made famous by the writings of Longfellow.

WATER GLASS, or **Soluble Glass**, the name given to any one of several alkaline silicates which contain a sufficient proportion of alkalies to render them soluble in water. Some substances of this class, such as Fuchs's soluble glass, are ordinarily insoluble in water, but they may be dissolved by placing it in boiling water. They are sirupy, transparent, and colorless and have a specific gravity of not less than 1.25. They are used for coating to preserve frescoes, the process being known as *stereochromy*, and their value consists in rendering the surface fireproof and waterproof. Other uses consist in the manufacture of certain soaps, earthenware, and artificial stone. In a modified



EROSION OF WATERFALLS.

form they are employed in the dyeing and printing of fabrics.

WATERHOUSE (wą'tẽr-hous), **Alfred**, ar-

chitect, born in Liverpool, England, July 19, 1830; died in 1905. He studied in Manchester and by traveling in Italy. Later he prepared designs for the Manchester Assize Courts, which were selected after a competitive test. He made drawings for the city hall and Owen's College, in Manchester, and soon after prepared designs for the Royal Infirmary at Liverpool. His works in London include the National Liberal Club, the City and Guilds' Institute, and the Saint Paul's Schools. In 1885 he was made a member of the Royal Academy. He received many medals and other awards from various associations. The Gothic style is a prominent feature of his designs.

WATER LILY, the common name of various plants resembling the true lily. They differ from the latter in that they are endogenous, that is, growing from within. On the other hand, true lilies are exogenous, that is, growing by external additions. About twenty species of water lilies are widely distributed in the lakes and rivers of the Temperate and Torrid zones. The fleshy rootstocks send rootlets down into the mud and long, cylindrical leafstalks grow upward, with circular or cordate leaves usually floating on the surface of the water. Beautiful solitary flowers, principally white, blue, or red, are borne on long cylindrical stalks and rise just above or float on the water. The *Victoria Regia,* native to the Amazon valley, is the largest water lily, its leaves ranging from five to twelve feet in width. The *sweet-scented water lily* is the best known plant of this class in North America. The *blue lotus* and the *white lotus* are water lilies native to the Nile. They bear pleasantly scented flowers and are cultivated extensively in hothouses. In most species the flower is of two days' duration. Some have leaves ranging in diameter from six to twelve feet, but they are somewhat smaller when cultivated in gardens.

WATERLOO (wą-tẽr-lo͞o′), a city in Iowa, county seat of Black Hawk County, on the Cedar River, 104 miles northeast of Des Moines. Communication is furnished by a network of electric railways and by the Illinois Central, the Great Western, and the Chicago, Rock Island and Pacific railroads. It has a large trade in grain, live stock, and merchandise. The noteworthy buildings include the county courthouse, the Federal post office, the city hall, the public library, two high schools, the Masonic Hall, the Presbyterian Hospital, the Ellis Hotel, and the Academy of Our Lady of Victory. Water power is obtained from the river, which is crossed by several bridges. The manufactures include flour, earthenware, clothing, cigars, brooms, and machinery. The streets are wide and regularly platted, crossing each other at right angles, and are substantially improved by pavements, electric lights, waterworks, and a fine system of electric railways, which connects the city with Cedar Falls. The region was first settled in 1846. Waterloo was incorporated as a city in 1868. Population, 1905, 18,071; in 1920, 36,230.

WATERLOO, a town of Belgium, in the province of Brabant, about ten miles south of Brussels. It is famous as the scene of the battle of June 18, 1815, in which the French army under Napoleon was defeated by the allied forces under Blücher and Wellington. The British army was commanded by Wellington and consisted of about 70,000 men, of whom 25,000 were British troops and the remainder were Germans and Belgians. This army had been defeated by Ney at Quatre-Bras on June 16 and had concentrated at Waterloo, while the German forces under Blücher had been defeated by Napoleon at Ligny. Napoleon had an army of 70,000 trained veterans, with which he intended to defeat the British before the German army could reach Waterloo, while Wellington aimed to hold his position until Blücher could arrive with his army, when it was designed to make an assault upon the French.

With the situation understood in this manner by Napoleon, the French began the battle about noon and continued the attack with great vigor until evening. They were on the point of winning the contest when Blücher came to the rescue with the German army and turned the tide of battle by hemming the French in between the allied armies. As a last resort, the Old Guard, constituted of the veterans from the Imperial Guard, charged upon the allied forces with remarkable persistence, but they were either cut to pieces or compelled to retreat, and Blücher was soon in vigorous pursuit of the retreating French. Estimates place the French losses at 42,000 and those of the allied armies at 23,000. This celebrated engagement accomplished the final downfall of Napoleon, and from it the expression, "To meet one's Waterloo," has become proverbial.

WATERMELON. See **Melon.**

WATER METER, a mechanism for measuring and recording the quantity of water or other liquid flowing through a pipe. Many devices of this kind have been patented, differing somewhat in general construction, but the principal parts are quite similar in all of them. The water meter in general use contains a chamber of spherical form, so constructed that water may flow freely through it by means of the entrance and delivery pipes. Within the chamber is a tightly fitting disk, mounted on a ball and socket bearing, which revolves under a slight pressure of water, and the flow of the liquid is measured with every turn of the disk. A recording device, consisting of wheelwork, is connected with the disk, hence the number of revolutions made is shown by the dials. Some meters register the pressure and thus afford data for a calculation of the flow of water, but these are not in extensive use. Water meters are employed in most systems of waterworks, each consumer having one of these mechanisms attached

to the pipe that furnishes the inflow, and in this way it is possible to determine the quantity used and for which he is to pay.

WATER POLO, a game of ball played by swimmers. The game somewhat resembles hockey, but the large, round ball is filled with air and floats upon the surface. It is played quite generally during the winter season, especially at colleges and other institutions which have ample swimming tanks. An even number of players take part in the game. The purpose of each side is to advance the ball by throwing or pushing it to the goal line of the opposing side.

WATERPROOFING, the art of rendering certain articles, such as paper and cloth, proof against penetration by water. A common method is to apply a coating of caoutchouc, but this has been found disadvantageous for some purposes, since articles coated in this way do not allow the passage of air. Woolen goods may be rendered impervious to water and at the same time permit the passage of air by dipping the cloth into a solution of soap, being careful to rub it thoroughly into the texture, after which it is dipped into a solution of alum. This causes a decomposition of the soap and alum, and the minute openings between the fibers are filled to the extent that water is excluded. Another plan is to dip the cloth into a solution of gelatine and isinglass, and afterward submerge it in a preparation of galls. This results in a kind of tanning process, the gelatine which has pervaded the cloth being rendered as insoluble as leather by the union with the tannin of the galls.

Mackintoshes and other similar wearing apparel are made by treating the fabrics with a solution of rubber. The goods are first coated on one side with a thin solution of rubber, after which the cloth is doubled, the coated sides being placed to face each other, after which pressure is applied. When finished for market, this product has the rubber coating on the inside. A good quality of this product is impervious both to air and to water. See **Oilcloth.**

WATERSPOUT (wạ'tẽr-spout), a phenomenon which is quite common to certain regions of the sea and is due to the action of whirlwinds or tornadoes. It usually consists of a whirling column of water, extending from the surface of a lake or the ocean to the cloud above. Waterspouts originate from the rapid condensation of vapor that takes place, owing to the different temperatures of opposite winds and to the rarefaction produced in the currents of revolving air. In many cases portions of the clouds descend and whirl in the form of a funnel-shaped mass. The whirl may draw a column of spray from the surface of the sea, which it unites with the mass above, and may move as an immense pillar over the surface. In fairly calm weather the waterspouts have a vertical position, while winds bring them into a position oblique to the horizon. Waterspouts, whirlwinds, dust clouds, and tornadoes are essentially the same, differing from each other mainly in the quantity of moisture, their dimensions, their intensity, or the degree in which visible vapor has been formed. See **Wind.**

WATERTOWN, a city of Massachusetts, in Middlesex County, on the Charles River, seven miles west of Boston. It is on the Boston and Maine Railroad and has communication by electric railways. The features include the public library, the Mount Auburn Cemetery, and the United States arsenal. It is the residence of many Boston business men. Among the manufactures are paper, starch, soap, hardware, needles, wire, and machinery. It was settled in 1630 and was the seat of important meetings at the beginning of the Revolution, including the second and third provincial congresses. Population, 1905, 11,202; in 1920, 21,457.

WATERTOWN, a city of New York, in Jefferson County, of which it is the capital. It is on the Black River, 90 miles north of Syracuse, and is on the New York Central Railroad. Among the noteworthy buildings are the county courthouse, the post office, the State armory, the Y. M. C. A. building, the Henry Keep Home for the Aged, and the Flower Memorial Library. Water power is supplied for manufacturing purposes by the Black River. The manufactures include silk and woolen textiles, flour, paper, scientific instruments, carriages, steam engines, canned fruits, and farming machinery. Among the general improvements are pavements, waterworks, electric street railways, and several parks. The place was settled in 1800 and became the county seat in 1805. It was incorporated as a city in 1869. Population, 1905, 25,447; in 1920, 31,263.

WATERTOWN, a city of South Dakota, county seat of Codington County, 98 miles north of Sioux Falls. It is on the Big Sioux River and on the Great Northern, the Chicago and Northwestern, the Chicago, Rock Island and Pacific, and the Minneapolis and Saint Louis railroads. The surrounding country is fertile. Three miles northwest of the city is Lake Kampeska, which is reached by a railway. Among the chief buildings are those of the county, a fine high school, and a number of churches. The industries include flouring mills, grain elevators, machine shops, stock yards, and manufactures of implements and machinery. It has a large trade in wheat, live stock, and merchandise. Population, 1900, 3,352; in 1920, 9,400.

WATERTOWN, a city in Wisconsin, at the boundary between Dodge and Jefferson counties, on the Rock River, 35 miles northeast of Madison. Transportation facilities are furnished by the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads. It is surrounded by a fertile farming and dairying country. The streets are paved substantially. They are improved by pavements, waterworks, and street railways. Among the manufactures

are cheese, flour, cigars, shoes, lumber products, machinery, and farming implements. Watertown has many fine public schools and churches. It is the seat of Northwestern University, a Lutheran institution founded in 1865, and of the Sacred Heart College, opened in 1872. Other features include the public library, the city hall, and many large business blocks. It has a large retail and jobbing trade in merchandise. Population, 1905, 8,622; in 1920, 9,299.

WATERVILLE, a city of Maine, in Kennebec County, on the Kennebec River, 18 miles northeast of Augusta. It is on the Maine Central Railroad and on Ticonic Falls, which supply an abundance of water power. The principal buildings include the public library, the high school, the city hall, the Colburn Classical Institute, the Ursuline Academy, and the Colby College. Among the chief manufactures are leather, edged tools, machinery, furniture, clothing, and textiles. Pavements, waterworks, street railways, and sanitary sewerage are among the municipal facilites. The place was settled in 1760, but was a part of Winslow until 1802. It was chartered as a city in 1888. Population, 1900, 9,477; in 1920, 13,351.

WATERVLIET (wą-tēr-vlēt′), a city of New York, in Albany County, on the Hudson River, 150 miles north of New York City. It is on the Delaware and Hudson Railroad and the Erie and the Champlain canals. The features include the public library, the high school, the city hall, and the Saint Patrick's Academy. The United States arsenal is located here, occupying a tract of 109 acres along the river front. It has a large trade in merchandise and farm produce. Among the manufactures are saddlery, furniture, stoves, carriages, cotton and woolen goods, cigars, and machinery. Watervliet was incorporated with West Troy in 1836, but was made a city in 1897. Population, 1920, 16,073.

WATER WHEEL. See **Wheel.**

WATERWORKS, a system of improvements and appliances to furnish a water supply. An ample quantity of pure water is of vast importance for the preservation of health in all cities. Wells drilled or dug in the ground are the common source of water supply in country districts. People residing in villages, small towns, and suburban districts utilize wells to a large extent. In many cases springs furnish ample quantities, while in some regions cisterns for storing rain water are the only source of supply. The greatest danger from impure water is in cities, where the soil may be polluted by impurities resulting from dense populations being crowded into a small space, thus tending to contaminate the water in wells. A system of waterworks is maintained in most towns and cities to overcome such dangers. Such a system involves both the collection of water at a common source and its distribution to consumers, usually by steam pumps, air compressors, tunnels, or aqueducts.

According to recent estimates, 3,575 systems of waterworks are maintained in the towns and cities of the United States, about three-fourths of which are under municipal ownership. On the other hand, practically all the systems of Canada are managed under the ownership of the municipalities. In nearly all instances the supply is both for domestic use and fire protection. Reservoirs or tanks located higher than the distributing pipes are utilized to distribute the water to consumers in the larger number of establishments, but in many large cities the pressure is obtained by pumping the water direct into the distributing pipes or mains. Large mains conduct the water on the principal streets and from them the smaller pipes carry a supply to offices, hydrants, and private residences. Loss in the water supply is prevented principally by charging each consumer for the water he uses and wastes, the measurements being effected by means of a water meter, an apparatus for recording the quantity of water passing through the supply pipe.

Some systems of waterworks are of vast extent, but it is possible to mention only a few of them. Indianapolis, Ind., derives its supply from artesian wells, which have a daily capacity of 25,000,000 gallons. The supply of water for Chicago is drawn from Lake Michigan by tunnels. Cribs are located several miles from the shore and from them the water is pumped by huge engines to central stations. Philadelphia derives its supply from the Schuylkill; Boston, from Cochituate Lake and Nashua River; and New York, from the Croton River by the reservoir system. Albany, N. Y., derives its supply from the Hudson River and has an immense water-purification plant, by which it is settled in reservoirs and filtered through beds of sand. In Saint Louis the supply is drawn from the Mississippi River. Milwaukee, Buffalo, and Cleveland are supplied from the lakes near those cities. Quebec derives its supply of water from Lake Saint Charles, seven miles distant, and that of Ottawa is obtained from an intake in the Chaudière River, about 3,000 feet above Chaudière Falls.

WATSON (wŏt′sŭn), **Henry Brereton Marriott,** author, born at Caulfield, Australia, Dec. 20, 1863. He was taken to New Zealand at the age of nine years, attended Canterbury College in Christchurch, and in 1885 went to England to engage in journalism. His first literary work appeared in the form of contributions to *The National Observer* and for a time he was assistant editor of the *Pall Mall Gazette.* Most of his productions are novels that deal with exciting adventures and a few are historical romances. They include "The Web of the Spider," "The Princess Xenia," "Chloris of the Island," "The Heart of Miranda, and Other Stories," "The House Divided," and "Godfrey Merival, Being a Portion of His History."

WATSON, James Craig, astronomer, born

in Fingal, Canada, Jan. 28, 1838; died in Madison, Wis., Nov. 23, 1880. He was born while his parents were visiting in Canada. In 1857 he graduated from the University of Michigan, at which he learned the art of grinding lenses. He became a professor of astronomy and director of the observatory of that institution, in 1863, and secured a like position at the University of Wisconsin in 1879. Watson discovered 23 asteroids, among them Io, Minerva, and Aurora, and in 1870 went to Sicily to witness an eclipse of the sun. He had charge of a company that observed the transit of Venus at Peking, China, in 1874, and was a judge of award at the Philadelphia Centennial Exposition in 1876. The government employed him in 1878 to observe a total solar eclipse in Wyoming. His writings include "Theoretical Astronomy," "Popular Treatise on Comets," and "Tables for Calculating Simple and Compound Interest and Discount." He was made knight commander of the Imperial Order of the Medjidiek by the Khedive of Egypt in 1875.

WATSON, John, author and clergyman, widely known by his pseudonym, *Ian Maclaren,* born in Manningtree, England, in 1850. He descended from Scotch parents, who settled at Perth, Scotland, in 1854. In 1870 he graduated from the University of Edinburgh and afterward studied theology at Tübingen, Germany. He first served as pastor of a Free Church congregation in Logiealmond, Scotland, a straggling village that furnished many of the striking features of his stories. He became pastor in Glasgow in 1877 and at Liverpool in 1880. His first writings appeared in the *British Weekly* and were afterward published in a volume called "Beside the Bonnie Brier Bush." Watson made several successful lecturing tours in Canada and the United States. His later writings include "The Days of Auld Lang Syne," "A Doctor of the Old School," "Kate Carnegie," and "The Mind of the Master."

WATSON, John Crittenden, naval officer, born at Frankfort, Ky., Aug. 24, 1842. He attended the United States Naval Academy, became a master in the navy in 1861, and saw service in the Civil War at Forts Jackson and Saint Philip. In 1862 he took part in the attack upon Vicksburg and the following year rendered efficient service in the Battle of Mobile Bay, where he was wounded. In 1898 he commanded the blockading squadron on the northern coast of Cuba, and the following year was made commander in chief of the naval forces at the Asiatic Station. He was made president of the naval retiring board in 1902 and served as special representative to the coronation of Edward VII.

WATSON, Thomas Edward, statesman and journalist, born in Columbia County, Georgia, Sept. 5, 1856. After attending the public schools, he studied at Mercer University, Macon, Ga., but a lack of means compelled him to leave that institution before graduating. Subsequently he studied law and was admitted to the bar. He was elected to the State Legislature as a Democrat in 1882 and in 1890 became a member of Congress. The People's party nominated him for Vice-President in 1896, when he received 27 electoral votes for that office, while Sewall received 149 and Hobart received 271. He established *Tom Watson's Magazine* in New York City, in 1905, but resigned as editor the following year. In two general elections, those of 1904 and 1908, he was the candidate for President on the Populist ticket, but did not receive any electoral votes. He published "History of France," "Life of Thomas Jefferson," and "Life of Napoleon."

WATT, James, famous inventor, born in Greenock, Scotland, Jan. 19, 1736; died Aug. 25, 1819. He was the son of a merchant and magistrate of Greenock, where he studied in the public schools. In 1755 he proceeded to London to learn the business of a philosophical instrument maker, where he likewise mended fiddles and other musical instruments. He became instrument maker to the University of Glasgow, in 1757, a position held by him until 1763, when he was appointed a civil engineer. In that line of work he surveyed for a commission that promoted a number of canals and harbor improvements. In the meantime he invented the micrometer, an instrument for measuring various small angles or dimensions, which is generally used in connection with a microscope or telescope. However, the invention that made the name of Watt famous is the modern condensing steam engine. It is said that he discovered the power of steam by observing its effect in passing from a teakettle. Though the steam engine had been employed before his time, it was an awkward and wasteful machine and could be used only in pumping at a slow rate.



JAMES WATT.

The invention of Watt adapted the steam engine to the purpose of driving machinery. Although this product has since been improved by a large number of inventors, the original machine employed the same principles which are now utilized. In 1774 he associated himself with Matthew Boulton, at Soho, near Birmingham, England, where large numbers of steam engines were manufactured. He retired from business in 1800 and conveyed his interests in manufacturing enterprises to his son, James Watt (1769-1848). The later years of his life were spent at his home near Bir-

mingham, where he invented or improved a number of mechanical appliances, including a press for copying. Watt was honored by being made a member of the National Institute of France and a fellow of the Royal Society of London. The University of Glasgow conferred a degree upon him in 1806, and a fine monument was erected to his memory in 1824.

WATTERSON (wŏt'tĕr-sŭn), **Henry,** journalist, born in Washington, D. C., Feb. 16, 1840. His father, Harvey McGee Watterson (1811-1891), was a journalist. He was educated by private tutors and at an early age became editor of the Washington *Democratic Review.* In 1861 he removed to Nashville, Tenn., and edited the *Republican Banner,* but soon afterward enlisted for service in the Confederate army. He was on staff duty from 1861 to 1863 and subsequently did scout service in connection with the army of General Johnston. At the close of the war he again edited the *Republican Banner* at Nashville, but subsequently founded the *Courier-Journal* at Louisville, Ky., which he made one of the most influential newspapers in America. He supported Horace Greeley for President in 1872 and Samuel J. Tilden in 1876. Though mentioned as a candidate for office, he persistently refused to enter the public service. However, he served in Congress from 1876 to 1877, but declined reëlection. In 1893 he delivered the dedicatory oration at the Columbian Exposition in Chicago. Watterson ranks as an able writer and speaker. He is the author of "Oddities of Southern Life and Character," "Life of Lincoln," and "History of the Spanish-American War." He died Dec. 22, 1921.



HENRY WATTERSON.

WATTS, George Frederick, painter, born in London, England, Feb. 23, 1817; died July 1, 1904. He studied in the Royal Academy, where he made his first exhibit of paintings, in 1837. In 1843 he exhibited "Caractacus" at Westminister Hall and received a prize of $1,500. His painting entitled "Alfred Inciting the Saxons to Prevent the Landing of the Danes" won a prize of $2,500 in 1846. He was made a member of the Royal Academy in 1867. Among his best known paintings are "Daphne," "Orpheus and Eurydice," "Love and Death," "Fata Morgana," "Meeting of Jacob and Esau," and "Love Triumphant."

WATTS, Isaac, clergyman and hymn writer, born in Southampton, England, July 17, 1674; died Nov. 25, 1748. His mother taught him in the classics when only in his fifth year, and at the age of eight he was able to write devotional pièces. In 1690 he enrolled as a student in an academy in London, and subsequently became pastor of the Independent congregation of Mark Lane, London. Overstudy at an early age had greatly impaired his health, hence he devoted his attention largely to literature and hymn writing instead of preaching. His works in prose include "The Use of Reason in the Enquiry after Truth," "First Principles of Geography and Astronomy," and "Improvement of the Mind." He is best known as the author of numerous beautiful hymns and psalms, many of them being still in use. These include "Joy to the World, the Lord has Come," "O God, Our Help in Ages Past," "Come, Holy Spirit, Heavenly Dove," and "Before Jehovah's Awful Throne." "Hush, My Dear; Lie Still and Slumber" is one of his many beautiful cradle hymns. A monument was built to his memory in Westminster Abbey. Southampton has a memorial hall that was dedicated to him.

WATT TYLER, an English soldier and the leader of a rebellion in 1381, in the reign of Richard II. The rebellion was occasioned by a poll tax levied on all persons over fifteen years of age, an act of Parliament which was almost universally unpopular among the people. Tyler became the leader of a band of insurgents, which afterward grew in numbers until an organized force of 100,000 men was obtained. This medley of rebels marched upon London and took possession of the Tower. While there they caused the death of the Archbishop of Canterbury. The king met Tyler at Smithfield, where he was stabbed by William Walworth, mayor of London, for apparent insolence in the presence of the king. Though relief was promised and the rebels dispersed, many of them were afterward severely punished for resisting renewed efforts to enforce the poll tax law.

WAUKEGAN (wą-kē'gąn), a city in Illinois, county seat of Lake County, 36 miles north of Chicago, on the Chicago and Northwestern Railroad. It is situated on a prominent bluff at the west shore of Lake Michigan, having a general elevation of about 100 feet above the lake, and is a favorite resort and summer residence for citizens of Chicago and Milwaukee. The chief features include the county courthouse, the public library, the high school, and the Masonic Temple. Sheridan Drive is a beautiful public drive along the lake front. It has electric street railways, waterworks and sanitary sewerage. The manufactures include wire, pumps, sugar, earthenware, vehicles, starch, and farming implements. Waukegan has a good harbor and regular connections by steamers in the summer months. It is the center of a large trade in live stock, cereals, and merchandise. Waukegan was settled in 1835 and incorporated as a city in 1859. Population, 1900, 9,426; in 1920, 19,199.

WAUKESHA (wą'kĕ-shą), a city of Wis-





(Opp. 3107) OCEANIC WAVES BEATING AGAINST THE COAST.

Coast of the Bay of Fundy.
Notice the Lighthouse.

Coast of Maine, U. S.

consin, county seat of Waukesha County, 18 miles west of Milwaukee, on the Fox River. It is on the Wisconsin Central, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. Numerous mineral springs make it a favorite summer resort for pleasure seekers and invalids. Water from these springs is shipped to many parts of the United States. The city is surrounded by a fertile agricultural country, which contains extensive quarries of excellent building stone. Among the noteworthy buildings are the county courthouse, the public library, the high school, the Carroll College, and the State Industrial School for Boys. It has manufactures of flour, ironware, machinery, utensils, cigars, and clothing. The streets are improved by pavements, waterworks, and street railways. It was settled in 1836 and incorporated in 1848. Population, 1920, 12,558.

WAUSAU (wą'są), a city of Wisconsin, county seat of Marathon County, on the Wisconsin River, 180 miles northwest of Milwaukee. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads and is surrounded by a fertile farming and stock-raising region. In the vicinity are extensive stone quarries, mineral deposits, and large tracts of valuable timber. Among the features are the city hall, the county courthouse, the post office, the public library, the asylum for chronic insane, and the Marathon County Training School for Teachers. The manufactures include lumber products, furniture, clothing, cigars, ironware, and machinery. An abundance of motive power is obtained from the Wisconsin River. It has brick and asphalt pavements and street railways. The trade in farm produce and merchandise is extensive. It was settled about 1850 and incorporated in 1872. Population, 1920, 18,661.

WAVE, the name applied to an advancing ridge or swell on the surface of a liquid, due to any force which causes the particles to be set in motion. Waves are either visible or invisible, depending upon whether they are apparent to the vision. *Visible* waves are caused when the surface of water is set in motion by the friction of the wind. *Invisible* waves result when a body is agitated by some force and consist of minute vibrations. They manifest themselves by their results, as in heat, light, and sound. If a tightly stretched wire or string, such as a piano wire or a violin string, is moved out of its position of rest momentarily, it is caused to move to-and-fro like a pendulum. This is true when the sides of a bell are struck. In either case sound waves are produced. The number of complete vibrations made by a vibrating body in one second is termed the *frequency of its vibration,* and the distance through which a wave moves in a given time is called the velocity. Sound waves travel in the air with the same velocity, whether they are the short waves which produce the shrill sounds, or the long waves which produce the grave tones. On the other hand, light is caused by a wave motion in the luminiferous ether, and heat is produced by the rapid to-and-fro motion of the molecules in a body.

Waves upon the surface of water result when the particles are raised by the wind and the surface is quieted, or assumes a condition of rest, through the force of gravity. In deep water the liquid mass does not advance, but the movement up and down is a local vibration. Apparently the wave progresses, but this is true only of the form, and is similar to the apparent motion of the thread of a screw when it is turned. The distance between the crests of two succeeding waves is called a *wave length,* and the corresponding parts of two different waves are their *like phases.* Wave motion in some parts of the sea is very complicated. A *tidal wave* may be moving steadily toward the west, distant storms may cause waves to move upon it, and ripples from the breeze then blowing may diversify the surface. This causes what is known as the *interference of waves. Breakers* do not occur in deep water, but are due to friction on the bottom of the sea, the effect being to retard the base of the wave while the crest rolls forward until a break occurs. Tidal waves are not noticeable on the surface of the ocean, but in some places become extremely high, sometimes twenty to forty feet, especially where the current flows into an estuary or a narrowing inlet. The waves of the ocean, due to heavy winds, frequently rise to heights of forty feet above the general level.

WAX, a solid fatty substance allied to the fixed oils and fats, derived both from animal and vegetable sources. It differs from the fats in having greater hardness and a higher melting point. True wax contains no glycerin, does not dissolve in water, and gives off a bright flame in burning. The specific gravity is .96 and the melting point is 155° Fahr. When its temperature is raised to 86°, it may be molded into any form by the hand. The term wax was formerly restricted to beeswax, but it is now extended to various bodies possessing similar characteristics, found widely diffused on various parts of plants, as on the leaves of some species, in the pollen of some flowers, and in many kinds of fruits. *Beeswax* is the principal insect wax. It is the product made by the honey bee in building its honey cells. It is constructed of the sweet juices of plants and in a natural state has a light yellow color, but when separated from the honey and bleached it becomes a beautiful white. Beeswax was formerly an important product for making candles, but its use for that purpose has been quite largely replaced by stearine. Other means of lighting, such as mineral oil and electricity, have largely superseded it as a lighting agency. However, it is still used for that purpose, for models in

casting, for statues in museums, and for wax fruit and flowers.

The chief vegetable waxes include *myrtle,* or *bayberry, wax,* which is made from a thin coating on the berries of the bayberry tree, and the *palm wax,* obtained in Columbia as an exudation on the surface of the growing leaves of the carnauba palm. *Chinese wax* is a secretion deposited by an insect closely related to the lac, and is found as a white coating on the branches of several species of trees. It is a highly important article of trade in China and Japan, where it is utilized for medicinal purposes and candle making. *Cuba wax,* which is imported from Cuba, resembles Chinese wax. It is somewhat softer than beeswax and may be dissolved in warm ether and oil of turpentine. *Japanese wax* is obtained from the small stone fruits of several species of rhus cultivated in Japan. *Mineral wax* is a natural product and is employed in the manufacture of candles. It is found oozing in small quantities from rocks of coal formation, chiefly in California, Rumania, Austria, and Scotland. *Sealing wax* is a commercial product of importance, but is not properly a wax. Wax is employed to a considerable extent in making figures in imitation of sculptures, especially those of human beings.

WAXAHACHIE, a city of Texas, county seat of Ellis County, thirty miles south of Dallas, on the Missouri, Kansas and Texas and other railroads. It has cotton gins, flour mills, grain elevators, and a large trade in merchandise and farm produce. Population, 1920, 7,958.

WAX PALM, a species of trees native to Colombia, which is noted for its secretion of a resinous substance, composed of one part of wax and two parts of yellow resin. These trees grow at elevations ranging more than 3,000 feet above the sea and attain a height of 150 to 175 feet. The resinous secretion covers the trunk, but is found more or less abundantly on the leaves, and is obtained by felling the tree. A large tree yields twenty to thirty pounds, obtained by scraping. The wax is used extensively in making candles and is known in the market as *Brazilian wax, carnauba,* or *palm wax.*

WAX PLANT, a class of plants of the milkweed family, so called from the waxlike appearance of the flowers and leaves. Most of the species are climbing plants, throwing out aërial rootlets. The leaves are opposite and fleshy and the flowers are sweet scented, growing in dense umbels. Several species are highly prized as house plants. The honeyworts and begonias belong to this class of plants. They take root readily and are easily cultivated in windows.

WAXWING, a class of birds native to North America and Europe, so named from the secondary wing feathers and the tail feathers being tipped with horny appendages resembling red or yellow sealing wax. The plumage is mainly brown and the head is decorated with an erectile crest. Most species are remarkable for their irregularity in migrating. Though all are birds of passage, they seldom visit the same summer quarters or winter retreats. Two species are native to North America, which some writers class with the flycatchers and others are classed with the chatterers. The *cedar bird* is a familiar North American species, but it is somewhat smaller than the waxwing proper. The *Bohemian waxwing* is the most widely diffused of the European species, visiting Northern Europe in the spring and migrating to Northern Africa and Southern Europe in autumn. It has a weak, whistling song and is easily tamed. The food consists of berries and insects.



COMMON WAXWING.

WAYCROSS (wā′krŏs), a city in Georgia, county seat of Ware County, 60 miles west of Brunswick, on the Atlantic Coast Line and the Atlanta and Birmingham railroads. The surrounding country is heavily timbered and produces live stock, cereals, and tobacco. Among the features are the county courthouse, the high school, and many fine churches. The manufactures include cigars, smoking tobacco, earthenware, and machinery. It has a system of sanitary sewerage, telephones, and waterworks. Population, 1900, 5,919; in 1920, 18,068.

WAYLAND (wā′lạnd), **Francis,** educator and author, born in New York City, March 11, 1796; died in Providence, R. I., Sept. 30, 1865. He studied medicine and theology at Union College and in 1816 was admitted to the Baptist ministry. The following year he became tutor of Union College, where he labored successfully until 1821, when he was called as pastor to the First Baptist Church, Boston. He was made president of Brown University, in 1827, and filled that position with the highest advantage to the university for 28 years. Wayland is noted for his ability as a lecturer, orator, and writer of numerous works. His best known writings include "Elements of Moral Science," "Limitations of Human Reason," "Duties of an American Citizen," "Intellectual Philosophy," "Political Economy," "The Collegiate System in the United States," "Memoirs of Thomas Chalmers," "Salvation by Christ," and "Sermons to the Churches."

WAYNE (wān), **Anthony,** eminent general, born in East Town, Pa., Jan. 1, 1745; died in Erie, Pa., Dec. 15, 1796. He studied in Philadelphia and afterward became a land surveyor. From 1774 to 1775 he was a member of the Pennsylvania convention, was made a member of the committee of safety in the latter year, and at the beginning of the Revolutionary War was commissioned colonel of a Pennsylvania regiment. He was slightly wounded while com-

manding in the Battle of Three Rivers, Canada, but soon after took charge of his command at Ticonderoga. In 1777 he was made brigadier general, commanded under Washington in New Jersey, and led the right wing at Germantown. At Valley Forge, in the winter of 1777-1778, he rendered efficient service on foraging raids within the British lines and in the latter year served at Monmouth. In 1779 he conducted an army of 1,200 men up to Stony Point, on the Hudson, without being observed, and by a gallant bayonet charge compelled the garrison to surrender. This brave exploit caused Congress to vote him a gold medal, and he was henceforth known as "Mad Anthony Wayne." Subsequently he assisted in the capture of Cornwallis at Yorktown and in 1782 took possession of Charleston, S. C. In 1783 he was made major general, in 1784 served in the Pennsylvania Legislature, and in 1792 commanded a force in the Northwest Territory. He built a fort on the present site of Fort Wayne, Ind., and in 1795 made a treaty of peace with the Indians. His death occurred while serving in Pennsylvania. A marble monument was erected to his honor in Radnor cemetery, near East Town, in 1809, by the Pennsylvania Society of the Cincinnati.



ANTHONY WAYNE.

WAYNESBORO (wānz′bŭr-ō), a borough of Pennsylvania, in Franklin County, 48 miles southwest of Harrisburg, on the Western Maryland and other railroads. It is important as a manufacturing and commercial center. Among the chief products are flour, pottery, furniture, machinery, engines, farm and dairy implements, and fertilizers. It has a number of fine schools, several academies, and numerous churches. Waynesboro, being located near South Mountain and Antietam Creek, was on the route of the Confederate army when passing to Gettysburg. Population, 1920, 9,720.

WEALTH, a collective term employed in common speech to designate riches, such as a large possession of money, goods, or lands. It is used in political economy to describe such objects as have utility and can be exchanged. Most writers apply a threefold test in determining whether commodities should be classed as wealth. They are utility, difficulty of attainment, and transferability. All objects having these three essential characteristics are classed as wealth. Although many others may have value, they are not regarded wealth in an economic sense. Thus air, health, and time, though highly essential, are not wealth in an economic sense, while wheat, houses and land are classed as wealth. Some writers speak of skill, intelligence, and all mental and physical habits that facilitate the production of wealth as *immaterial wealth,* while all the objects answering to the threefold test stated above are classed collectively as *material wealth.* Since material wealth can be passed from one person to another, it is implied that one can have a right of property in it, that is, one may own it. Labor is the only source of wealth, and by it alone can be increased the individual and national wealth. See **Capital.**

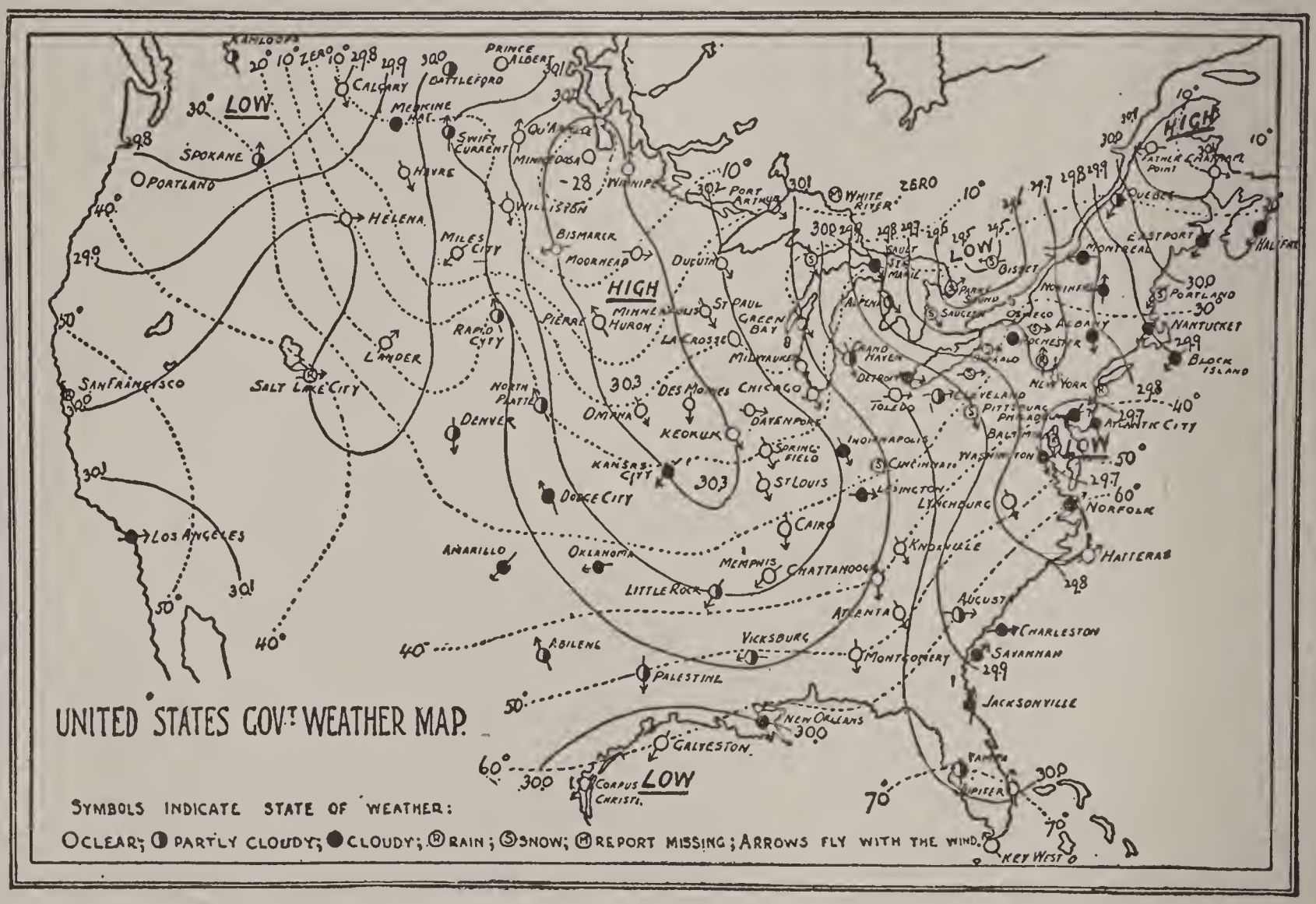
WEASEL (wē′z'l), a group of quadruped mammals of the Northern Hemisphere, which includes a number of widely diffused species. The body is slender, usually about eight inches long and three inches high, and the back generally is much arched. The tail is about three inches long, the legs are short, the ears are small and rounded, and the fur is fine and close. When irritated or alarmed, they emit a disagreeable odor. Most species are reddish-brown above and pure white underneath, and those in cold regions turn completely white in winter. The common weasel is native to the region extending from the Atlantic Ocean to Nebraska and northward. They feed on rats, mice, moles, and small birds. In some regions they are a pest to poultry. Not only can the weasels pursue their prey through very small holes and crevices of rocks, but they are able to climb the trunks and branches of trees with rapidity and swim with perfect ease and safety. Their fur is highly valuable in making wearing apparel. They build their nests of herbage and dried leaves or in a hollow tree, where they rear four to six young, which the mother defends with much devotion. An American species known as the *fisher weasel* is about two feet long. The *bridled weasel* of Texas and



WEASEL IN SUMMER.

Mexico is distinguished by several white spots on the head. The polecat, sable, ferret, ermine, mink, marten, skunk, otter, and stoat are allied animals.

WEATHER BUREAU, an organization maintained by the government for making meteorological observations, predicting weather and storms, and reporting atmospheric phenomena for the benefit of mankind. Bureaus of this kind are supported by the leading governments of the world. They have been the means of obtaining much useful information in regard to the occurrence of rainfall, frost, floods, storms, and other phenomena of the weather which materially affect industry. Observations of this kind have been made and reported in the United States since 1818, when meteorological reports were first issued by the surgeon-general of the army, but the weather bureau as now organized dates from 1891, when the organization was made a part of the Department of Agriculture. Canada, Great Britain, Germany, Japan, and France likewise have weather bureaus of a very high class.



DIVISIONS. The weather bureau as at present organized includes several divisions that have charge of special lines of duty. For instance, the *forecast division* gathers information and makes predictions as to the weather at definite times each day. These forecasts are based upon reports received daily from the stations which are distributed in all parts of the country. They cover a period of from 20 to 48 hours and are sent out in the form of *weather maps,* or *charts.* The weather bureau of the United States sends daily weather forecasts to more than 2,250,000 addresses. Most of these are reached by telephone without expense to the government, but a large number are reached by mail, by train service, and by railroad telegraph. The *division of climate and crops* reports data in regard to rainfall, temperature, and other climatic conditions which affect the agricultural and other interests. The *division of river and flood service* obtains and distributes information relative to rain, snow, ice, and other phenomena which may stimulate or retard navigation and commerce. Other divisons include those of *publications, supplies,* and *records.* The *Monthly Weather Review,* which is issued regularly by the bureau, is an official publication for distributing information of value to farmers and stock raisers. It is sent free upon application to any one who may be interested in receiving reports at stated times.

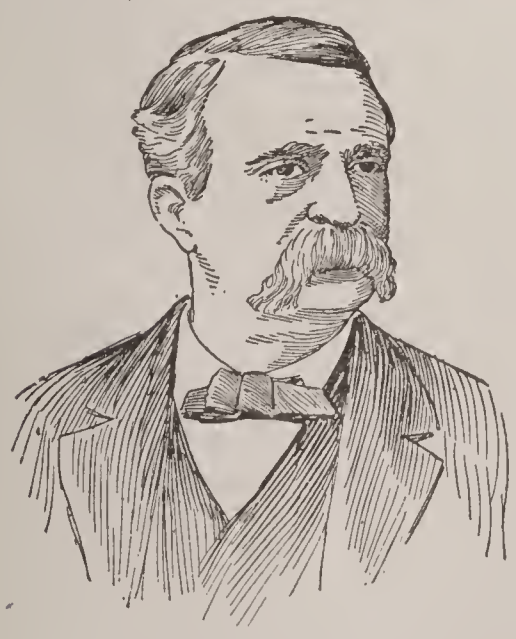
FORETELLING THE WEATHER. A system of rules has been adopted for use with aneroid barometers. These rules have special reference to a steady barometer, a rising barometer, and a falling barometer. A *steady barometer,* when the weather is dry and the temperature is seasonable, indicates a continuance of very fine weather. A *rising barometer,* when rising rapidly, indicates unsettled weather, while a gradual rise indicates settled weather. A rise with dry air and cold increasing in summer indicates wind from the northward, but, if rain has fallen, better weather may be expected. Southerly winds accompanied by a rise indicate fine weather. A rise with moist air and a low tem-

perature indicates wind and rain from the northward. A *falling barometer,* when rapid, indicates stormy weather. In winter, when the fall is accompanied with dry air and increasing cold, it is liable to snow. A fall after very calm and warm weather indicates rain with squally weather. The rules in general use are quite elaborate, but those indicated are examples of the more important ones.

UTILITY. Actual experience has demonstrated the utility of a well organized and conducted weather bureau service. Regular reports are received daily by telegraph, at 8 A. M. and 8 P. M., and the forecasts are based upon these for the next 36 hours. These telegrams are sent from all parts of the country, being forwarded by thousands of voluntary and special observers. After they are tabulated with much care, they are prepared for publication in newspapers and to be sent out on postal cards and by telegraph. Signals based upon these reports are displayed upon the principal government buildings and elsewhere in many parts of the country. In this way much profit has been obtained by those who are interested in commercial enterprises, since they may modify their plans so as to be less unfavorably affected by severe atmospheric conditions, or may take advantage of favorable prospects. See **Signals.**

WEATHERFORD (wĕth'ẽr-fẽrd), a city of Texas, county seat of Parker County, situated in a farming and stock-raising region, 65 miles west of Dallas. It is on the Texas and Pacific, the Gulf, Colorado and Santa Fé, and other railroads. The noteworthy buildings include the county courthouse, the high school, the Saint Joseph's Academy, the Weatherford College, and the Texas Female Seminary. Among the industries are grain elevators, cotton gins, flouring mills, potteries, stock yards, and machine shops. It has a growing trade in merchandise and farm produce. Population, 1920, 6,203.

WEAVER (wēv'ẽr), **James Baird,** public man, born in Dayton, Ohio, June 12, 1833; died Feb. 6, 1912. He graduated from the Cincinnati College in 1854, removed to Iowa in 1856, and served with distinction in the Union army, attaining to the rank of brigadier general. After the close of the war he became a district attorney, in 1866, and afterward edited the *Iowa Tribune,* at Des Moines. In 1878 he was elected to Congress as a Greenback candidate and in 1880 was the candidate of that party for President, receiving 308,578 votes. He was reëlected to Congress in 1884 and again in 1886, and in 1892 became the presidential candidate of the People's party, receiving 1,030,128 of the popular votes and 23 of the electors. General Weaver attained a wide reputation as an able champion of the labor issues and of bimetallism. In three campaigns he was an active and devoted supporter of Bryan for the Presidency. His life-size portrait was placed in the Iowa Historical Building in 1908.



JAMES B. WEAVER.

WEAVER BIRD, a class of birds of the finch family, which are native to the warmer climates. They are noted for their habit of



WEAVER BIRDS AND SOCIAL WEAVER BIRD'S NESTS.

hanging a closely woven nest in the form of a pouch from the branches of trees. About 250 species have been described by naturalists. They are more or less widely distributed in Australia, Africa, and Asia. Some weaver birds build their nests singly, but most species unite in communities and occupy a large structure in common. The *social weaver birds* of Africa belong to the latter class, their nests being built under a common overhanging roof, which all of a group unite to construct, but afterward each pair completes its own nest. Several hundred separate nests are often built after this manner, and they are usually constructed on trees which are difficult to reach by intruders. The individual nests form separate compartments and are entered by different passages. Some species build single, pouchlike nests, containing one compartment, which they enter from

below, and to secure protection against monkeys, snakes, and squirrels suspend them from small branches hanging over water. The *Philippine weaver bird* is native to Southeastern Asia and the *paradise weaver bird* is found in India. The latter is one of the most beautiful and the largest of the species. Its general color is black, with markings of orange of various shades. It is a favorite cage bird, being noted for its beautiful plumage and delightful song.

WEAVING (wēv'ĭng), the art of interlacing threads of different kinds, such as silk, wool, or cotton, thus forming a woven fabric. The loom is the frame or machine employed in weaving, and in its simpler form has come down to us from the nations of antiquity. Though clothing was first made of the skins of animals and of the leaves of trees, it is evident that spinning and weaving were practiced in the Stone Age of man. Evidences of this have been found in the lake dwellings of Switzerland, where spindle whorls and fabrics of flax were secured from among the remains. Weaving is represented in the sculptures on Egyptian tombs at Thebes. Women and slaves were highly skilled in hand weaving in ancient Phoenicia and Greece.

Although the hand looms of the ancients were everywhere rude, they turned out excellent fabrics, many of them equal to the best made at the present time. The chief objection to the hand loom was that too much time was consumed in turning out the product, hence the improvement and invention of the power loom became an important subject for study. Weaving was not developed in England until in 1732, when a number of weavers settled there from the continent, and Charles Wyatt, of Birmingham, in 1738, patented a machine for spinning by means of rollers. In 1784 Cartwright invented the power loom, but it has been successively improved and other machines have been invented by which weaving has become a rapid process under the application of steam and electric power.

In all kinds of weaving, whether plain or figured, two sets of threads are employed, which traverse each other at right angles in the web. The one set of threads is called the *woof,* or *weft.* They are made to pass alternately under and over the other system of threads called the *web, warp,* or *chain.* In weaving fabrics of any kind the warp threads are fastened in the loom, the number used depending on the fineness and width of the cloth. The woof or cross threads are wound on bobbins or spools and are placed in a shuttle. The warp threads, being stretched in the loom, are acted on by a movement that lifts and lowers alternate threads, thus allowing the shuttle to pass from side to side between the two sets of threads. When the woof thread has been carried between the warp threads, the lower threads are raised and the upper threads are lowered, after which the shuttle is returned. In this manner the shuttle consecutively carries the woof thread to and fro until the entire piece of cloth is completed. The shuttle is moved by hand in the hand looms and the threads are alternated by the action of the foot, but in power looms all the movements are by machinery.

Plain weaving consists of alternating every other warp thread. Besides this common method, many other kinds of weaving may be mentioned, such as taking up one thread and leaving two or three, interlacing to form a double cloth, and pile weaving. The last named process is employed in making velveteens, velvets, and Turkey carpets. It consists of leaving pile warps above the surface in the form of loops, which are afterward cut by an attached mechanism to form the pile. Many other forms of weaving are utilized, such as are used in producing figured goods, and in interweaving different kinds of threads and threads of various colors. Weaving is applied in a more or less modified form in making cotton and woolen textiles, ribbon, carpet, silk goods, tapestry, damask, and velvet.

WEBB, Alexander Stewart, soldier, born in New York City, Feb. 15, 1835; died Feb. 12, 1911. His father, James Watson Webb, sent him to the West Point Military Academy, where he graduated in 1855. In 1857 he was made professor of mathematics at West Point and at the beginning of the Civil War entered the Union army, taking part in the Battle of Bull Run. He commanded through the peninsular campaign in 1862, led a brigade at the battles of the Wilderness and Spottsylvania in 1864, and served on the staff of General Meade from 1864 to the close of the war. In 1865 he was made major general of the United States army, became professor at West Point shortly after, and in 1869 was elected president of the College of the City of New York. He published "The Peninsula: McClellan's Campaign of 1862." Hobart College conferred a degree upon him in 1870.

WEBB, James Watson, journalist and diplomatist, born in Claverack, N. Y., Feb. 8, 1802; died in New York City, June 7, 1884. He was educated at Cooperstown, N. Y., and in 1819 was commissioned as second lieutenant in the United States army. In 1826 he resigned from the army and became editor of the New York *Morning Courier,* which was consolidated with the New York *World* in 1861. Webb was appointed minister to Austria in 1849, but the Senate refused to confirm the appointment. He served as minister to Brazil from 1861 to 1870 and in the meantime negotiated a treaty for the removal of French troops from Mexico. He is the author of "Slavery and Its Tendencies," " Life and Adventures in the Rocky Mountains," and "National Currency."

WEBB, Sidney, author, born in London, England, July 13, 1859. He was trained by private tutors and at the London College, and subsequently attended universities in Germany and

Switzerland. In 1885 he was called to the bar, held several municipal and government offices, and for some years was a lecturer on economic branches in the London School of Economics and Political Science. His writings consist mostly of works devoted to labor and political questions. They include "Socialism in England," "History of Trade Unionism," "The Eight Hours' Day," "The Coöperative Movement in Great Britain," "Industrial Democracy," and "The History of Liquor Licensing."

WEBB CITY, a city of southwestern Missouri, in Jasper County, eight miles west of Carthage, on the Missouri Pacific and the Saint Louis and San Francisco railroads. It has a growing trade in cereals, minerals, and fruits. The features include the high school, the public library, and many fine churches. The surrounding country contains deposits of zinc and lead, which minerals are mined profitably. The improvements include sanitary sewerage, street pavements, waterworks, and several parks. Fruit gardens and orchards are profitable in the vicinity. Population, 1900, 9,201; in 1920, 7,807.

WEBER (vā'bĕr), **Carl Maria Friedrich Ernst von**, musical composer, born near Lübeck, Germany, Dec. 18, 1786; died June 5, 1826. He descended from a family which is noted for its musical talent and showed early inclination to become a master musician. His father being a musical director, it became necessary that his instructors should be changed with each change of residence, but he studied principally under Michael Haydn at Salzburg and Kalcher at Munich. He composed an opera, called "Power of Love and Wine," when but thirteen years of age and the following year completed his "Forest Maiden," which was soon after put on the stage. In 1804 he became conductor of the opera at Breslau and two years later was engaged at Carlsruhe, in Silesia, by Prince Eugene of Württemberg. He was musical director of the opera at Prague from 1813 to 1816 and in the latter year founded the German opera at Dresden. His most famous opera, "Archer" (Der Freischütz), was brought out at Berlin in 1822 and soon after was produced on the stage at Vienna, Paris, and London. In 1823 he completed his "Euryanthe," which was rendered amid much enthusiasm in Vienna, and soon after he accepted an invitation to visit London, where he produced his famous "Oberon." He died while in London, but his body was removed to Dresden, where a fine statue of him was erected in 1860. Weber is classed among the most eminent musical composers of the last century and is the author of many operas, songs, and concertos. His productions not already named above include "Peter Schmoll and His Neighbors," "Abu Hassan," "The Hunter's Bride," "Sylvana," "Guide of the Spirits," "Contest and Victory," "The First Tone," "Preciosa," and "Invitation to the Waltz."



CARL VON WEBER.

WEBSTER (wĕb'stĕr), a town of Massachusetts, in Worcester County, on the French River, fifteen miles south of Worcester. It is on the Boston and Albany and the New York, New Haven and Hartford railroads. The place was incorporated in 1832. Population, 1920, 13,258.

WEBSTER GROVES, a city of St. Louis County, Mo., 10 miles west of St. Louis, on the Missouri Pacific Railway. The place is popular as a residential center and has electric railway communication with St. Louis. It was settled in 1866 and incorporated in 1894. Population, 1910, 7,080; in 1920, 9,474.

WEBSTER, Daniel, statesman and orator, born in Salisbury (now Franklin), N. H., Jan. 18, 1782; died in Marshfield, Mass., Oct. 24, 1852. He descended from the family of Thomas Webster, a Scotchman, who settled in New Hampshire in 1636. His father, Ebenezer Webster, was a captain in the French and Indian Wars. At the time of his youth the schools were still in a very primitive condition and for much of his early training he was indebted to his mother, who was ambitious that her children should obtain an education. Young Webster, being of a studious nature, made considerable progress in the elementary branches by study at home and in a few short winter terms of school, and in 1797 his father succeeded in securing ample money to send him to Dartmouth College. He remained in college four years, though not without working and teaching school to raise sufficient money to defray his expenses, and in 1801 graduated. Soon after he secured a position as teacher at an academy in Maine with a salary of $350 per year, but devoted a part of his savings to aid a brother in his college work, and afterward entered upon the study of law. In 1805 he was admitted to the Massachusetts bar in Boston and began the practice of that profession in Boscawen, N. H. Soon after he removed his office to Portsmouth, then the largest city in the State, where he rapidly rose as a leader in his profession.



DANIEL WEBSTER.

Webster was elected to Congress in 1812 and took his seat in the special session of May, 1813, serving on the Committee on Foreign Affairs. His first speech in Congress was delivered on June 10, 1813, and was based on a resolution touching the decrees of Berlin and Milan. The remarkable display of historical knowledge and oratorical power sent a thrill through the nation, particularly because Webster was at that time unknown outside his own State, and he soon after made equally powerful speeches in favor of repealing the embargo law and increasing the navy. In 1814 he was again elected to Congress and soon after removed to Boston, where he devoted himself entirely to the law profession after the expiration of his term of office. Many important cases were brought to Webster and he attained to the front rank as a constitutional lawyer. His first celebrated case was that affecting the charter of Dartmouth College, which was heard before the United States Supreme Court, in 1818, and involved the obligation of contracts and the constitutional powers of the country. In 1820 he was chosen to deliver the oration on the 200th anniversary of the landing of the Pilgrims at Plymouth, when, by his masterful oratory, he thrilled the spirit of American patriotism. Another remarkable address was delivered in 1825, fifty years after the Battle of Bunker Hill, on the occasion of laying the corner stone of the Bunker Hill monument. In 1826 he delivered another great address, that on the fiftieth anniversary of the Declaration of Independence. These addresses placed him at the head of orators in America.

Webster was reëlected to Congress in 1822 and served continuously until 1827, when he was chosen United States Senator for Massachusetts. He remained a member of the Senate until his death, except while serving as Secretary of State. His senatorial service covered 22 years, thus making his total congressional career extend over a period of 30 years. His first celebrated speech in the Senate was in favor of the protective tariff of 1828, and two years later he made his famous reply to Hayne on the Foote resolution, by which he won the title of "Expounder of the Constitution." He strongly opposed the doctrine of nullification and was often pitted against Calhoun. Next to Clay he ranked as the most prominent man in the Whig party. In 1836 he received fourteen electoral votes for the Presidency and, in 1841, was chosen by President Harrison as Secretary of State. At the death of the latter, in 1841, all the cabinet officers except Webster resigned, but he also resigned in 1843. Though this course lost him the friendship of many Whigs, it was highly important that his statesmanship should come into play in the many questions then pending between the United States and Great Britain. These included the controversy regarding the right of forcibly searching American vessels by English seamen on the coast of Africa and the dispute concerning the boundary of Maine, the latter being adjusted by the Webster-Ashburton Treaty in 1842.

In 1845 Webster reëntered the Senate, where he made several famous speeches on the Oregon question and later on the compromise measures proposed between the North and the South regarding slavery. He was mentioned prominently for the Presidency in 1848, and from 1850 to 1852 again served as Secretary of State. In 1852 he was mentioned for President, but the nomination was given to General Scott, whom he refused to support. The keynote of Webster's statesmanship was the preservation of the Union, and, while opposing the nullifiers as enemies, he denounced the abolitionists. He was fond of outdoor exercise, enjoyed a large personal friendship, and was a man of fine physique and remarkable talent. His speeches were published in 1851 and in 1858 two volumes of private correspondence were made public. A number of his speeches are counted among the American classics. Many extracts from them have been published in text-books that are used by children of the public schools. An imposing statue of Webster, executed by Thomas Marshfield, is situated in Central Park, New York.

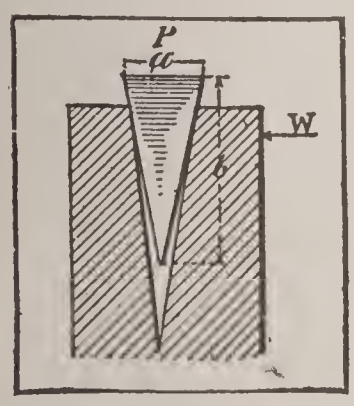
WEBSTER, Noah, lexicographer, born in West Hartford, Conn., Oct. 16, 1758; died May 28, 1843. He was the son of a farmer and his early years were spent in work on the farm, while his winters were given to study in the district school. In 1772 he undertook the study of the classics under Nathan Perkins, a minister, and two years later entered Yale University. He began the study of law in 1778, but was compelled to sustain himself by teaching school. While teaching at Goshen, N. Y., he published "Grammatical Institute of the English Language," a work treating of spelling, reading, and grammar. In 1785 he delivered a course of lectures on the English language in many leading cities, and in 1787 advocated the new constitution by publishing "Leading Principles of the Federal Constitution." He established a law office at Hartford, in 1789, and soon after aided in founding the *Commercial Advertiser* and the New York *Spectator.* In 1798 he settled at New Haven, Conn., where he was chosen to the General Assembly of the State, and in 1812 became the first president of Amherst College. He made a tour to Europe in 1824 to consult the leading libraries in regard to his work of preparing a large dictionary, but returned to America the following year. His complete dictionary, entitled *The American Dictionary of the English Language,* was published in 1828 and an enlarged edition appeared in 1841. The most popular of his smaller books was his "Webster's Spelling Book," of which about 75,000,000 copies were sold. Other works not named above include "Dissertations on the English Language," "Sketches of American

Policy," "The Rights of Neutrals," "The Revolution in France," and "A Collection of Papers on Political, Literary and Moral Subjects."

WEBSTER-ASHBURTON TREATY. See **Ashburton Treaty.**

WEBSTER CITY, a city of Iowa, county seat of Hamilton County, 72 miles north of Des Moines. It is situated on the Boone River and on the Illinois Central and the Chicago and Northwestern railways. The surrounding country produces large quantities of cereals and live stock. Among the chief buildings are the county courthouse, the Kendall Young Library, the Jacob Funk Hospital, the city high school, and a number of fine churches. It has manufactures of cigars, canned goods, clothing, and machinery. Brick pavements, waterworks, and sanitary sewerage are among the public utilities. The first settlement in the vicinity was made in 1857. Population, 1905, 4,797; in 1920, 5,657.

WEDGE, one of the simple mechanical powers, being a modified form of the inclined plane. In the wedge the plane is moved under the weight, instead of moving the weight up the plane. It is used for splitting wood or stone, in lifting vessels in the dock, and in pressing oils or juices from seeds. Two classes of the wedge are in use, the single wedge and the double wedge. The latter is the more common type and is shown in the illustration. The force of a wedge is very great, since it is driven into position with a hammer or sledge. Axes, nails, pins, and knives are made on the principle of the wedge.



DOUBLE WEDGE.

WEDGWOOD (wĕj'wo͝od), **Josiah,** distinguished potter, born in Burslem, England, July 12, 1730; died Jan. 3, 1795. He was the son of Thomas Wedgwood, a potter in Burslem, and from him learned that trade. In 1751 he became manager of a pottery in the vicinity of his native town, and eight years later started into the business on an independent scale. He was not satisfied with the results obtained in the pottery business, but made many improvements, such as manufacturing a cream-colored porcelain, which became known as *queensware.* His success in producing ornamental pottery was the means of bringing him a large fortune. He founded a village called Etruria, in 1771, where he developed the largest pottery enterprise known in England up to that time. It is due to Wedgwood that the Staffordshire potteries became famous. He reproduced the famous *Portland Vase,* executed paintings on pottery, and originated the Wedgwood ware, a superior grade of semivitrified pottery capable of taking on delicate colors. It is valuable because it does not contain any artificial gloss.

WEDNESDAY (wĕnz'dā), the fourth day of the week, named from Woden or Odin, the chief Scandinavian deity. According to an old superstition, Wednesday was considered neither particularly lucky nor dangerous.

WEED, Thurlow, journalist, born in Cairo, N. Y., Nov. 15, 1797; died in New York City, Nov. 22, 1882. He became a cabin boy on a Hudson River sloop, when he was ten years of age, and two years later entered a printing office in Catskill, N. Y. In 1812 he enlisted in the army, serving on the northern frontier of New York until 1815, when he entered a printing office in New York City as compositor. He became editor of the *Agriculturist,* a periodical devoted to farming and dairying, which he published from 1819 to 1821, and afterward founded the *Onondaga County Republican* at Manlius, N. Y. In 1824 he became editor and owner of the Rochester *Telegraph* and two years later entered the Legislature as an Anti-Mason. After serving two terms in the Legislature, he established the Albany *Evening Journal,* which he published for 35 years. As an editor he opposed the administration of President Jackson and the nullification policy of Calhoun and was active in promoting the election of William Henry Harrison in 1840. He advocated the nomination of Henry Clay for the Presidency in 1844, General Scott in 1852, and John C. Frémont in 1856. In 1860 he promoted the candidacy of Abraham Lincoln and the following year went to Europe to aid in maintaining the neutrality of the European nations in the Civil War. He became editor of the New York *Commercial Advertiser* in 1867. His writings include "Letters from Europe and the West Indies," "Reminiscences," and "Autobiography." The last mentioned was edited and published by his daughter in 1884.

WEEDS, the general name applied to plants that are troublesome in cultivated grounds, owing to their persistence and rapid growth. Many weeds are obnoxious because they take up the fertility of the soil which should be utilized in supporting the cultivated plants, and in some cases they suppress the useful variety. Others are injurious to stock, or produce seed that decreases the value of cereals when mixed with them. The *cocklebur, morning-glory, milkweed, Canada thistle,* and *Russian thistle* are obnoxious weeds that are difficult to destroy even by careful cultivation. *Foxtail* is a widely distributed weed, but it is not particularly injurious, unless it is permitted to grow so densely that it will smother the cultivated plants. *Burdock* is a deeply rooted plant that is difficult to destroy. *Wild mustard* and *dandelion* are classed with the obnoxious weeds, but the last mentioned is cultivated for its flowers in some localities. In general it is best to cultivate the ground carefully at or before the time of seeding, since it is much easier to keep the ground clean than to

destroy the weeds after they have become firmly rooted. Where weeds are permitted to mature from year to year, they fill the ground with seeds, thus making it more difficult and undesirable for cropping. Fields in this condition are greatly benefited by seeding with clover, timothy, or other useful grasses.

WEEK, the space of seven consecutive days, especially the cycle beginning with Sunday, the first day of the week, and ending with Saturday, the last day. The week has been in use in eastern countries for reckoning time since prehistoric times, but was not introduced into the Roman calendar until after the reign of Theodosius, in the 4th century A. D. It is probable that the week was first instituted as a division of the periodical month, corresponding to the four quarters of the moon, or about seven and three-eighths days. The days of the week were named from the astrological notion that each of the seven heavenly bodies best known to the ancients had a modifying influence on the days according to the distance from the earth, and each body was regarded as presiding over an hour of the day. Hence, the Roman week was divided into seven days. These days were named in order from the sun, the moon, Mars, Mercury, Jupiter, Venus, and Saturn. The Jews and the early Christians applied no special names to the different days, but counted from the previous Sabbath; thus, Sunday was the first after the Sabbath, Monday the second, etc.

The Latin nations still retain the names derived from the Roman deities, but in the Germanic languages they have been replaced by names taken from those of the corresponding Germanic deities, except Sunday, Monday, and Saturday, these being still named after the sun, moon, and Saturn. Tuesday is named from Tyr, as the equivalent of Mars; Wednesday from Woden, for Mercury; Thursday from Thor, for Jupiter; and Friday from Freya, for Venus. The Society of Friends designates the days by their numbers, beginning with Sunday, as First-day, Second-day, etc. Both Jews and Arabs count the day as beginning and ending with sunset. The Jews and many Christians keep Saturday as the Sabbath, while the Mohammedans observe Friday.

WEEVER (wē′vẽr), or **Stingfish,** a class of small marine fishes found off the coasts of Europe, noted for the unpleasant wound they are able to inflict by the sharp dorsal spine. The weevers belong to a family of spiny-rayed fishes. They have a long body with two dorsal fins, a covering of very small scales, and a greatly compressed head. Wounds inflicted by the dorsal and opercular spines are very painful, owing to the mucous secretion being somewhat poisonous.

WEEVIL (wē′v'l), an extensive genus of insects, which are distinguished by having the head elongated into a long snout or rostrum, bearing the mouth parts at the end and the antennae at the sides. The various species are widely diffused and in the larval form are often highly destructive to roots, leaves, and fruits. Some species lay their eggs on the leaves of trees and afterward cut the leafstalk partly through, thus causing it to fall to the ground. The young insect feeds upon the leaves until sufficiently developed to bury itself in the ground, where it remains in the chrysalis state until the return of spring. Other species, such as the *plum weevil,* or *curculio,* attack pears, plums, cherries, grapes, peaches and apples. They lay their eggs in an opening made in the fruit by a small sting when it is quite small and, when the grub or larva is hatched, it eats its way into the stone or center of the fruit, thus causing it to fall from the tree. In this way access is obtained to the ground, which is entered by the larva, and the developed insect soon appears.

The best known species of these insects include the *corn weevil, boll weevil, bean weevil, grain weevil, nut weevil, rice weevil, grape weevil, palm weevil, clover weevil,* and *pine weevil.* All these species are more or less destructive to fruits, grains, and nuts. The *pine weevil* infests the pine forests of temperate and warm climates, often stripping those trees of their leaves. The *pear weevil* in a similar manner infests the pear tree. Turnips are subject to ravages by weevils. Though the species attacking those vegetables are quite small, they feed on both the leaves and the roots. It has been found that the best security against many species of weevils is obtained by protecting the birds that feed upon their larvae, but certain species attacking fruit may be destroyed by careful application of chemicals. See **Insects.**

WEEKS, John Wingate, public man, born at Lancaster, N. H., April 11, 1860. He served as midshipman from 1881 until 1883, then became land commissioner in the South, and subsequently engaged in banking in Boston. Here he was elected alderman and later served as mayor, and in 1905 was elected to Congress, serving until 1913, when he became U. S. Senator. He was prominent as a candidate for President in 1916, when he received 105 votes in the Republican national convention. President Harding, in 1921, made him Secretary of War.

WEIDNER (vēd′nẽr), **Revere Franklin,** clergyman and author, born in Centre Valley, Pa., Nov. 22, 1851. He descended from German parentage and graduated from Muhlenberg College, Allentown, Pa., in 1869, and from the Lutheran Seminary, Philadelphia, in 1873. Subsequently he occupied pastorates in New Jersey and in Philadelphia. In 1878 he became professor in the Augustana Theological Seminary, Rock Island, Ill., a Swedish-English Lutheran institution of learning. He was made chairman of the faculty of the Lutheran Theological Seminary, Chicago, in 1891, and for several years was instructor of Hebrew in summer schools under the direction of William R. Harper.

WEIGELIA (wī-gē'lĭ-ȧ), an ornamental plant of the honeysuckle family, which is widely cultivated for its profuse flowers. Several species are native to China and Japan, whence they were brought to North America, but a number of species are indigenous to America. They are bushy shrubs, growing to a height of five to six feet. The leaves are oval and taper to a point. In most species the flowers are funnel-shaped and usually are white or pink in color. The *Rocky Mountain Weigelia* is a bush about four feet high and the *southern bush honeysuckle* has sessile leaves, the stalk growing about four feet high. These plants are less showy than those native to China.

WEIGHING MACHINE, a mechanism used to ascertain the weight of bodies. Since weight is the result of the attraction of gravitation upon a body, an object or body does not have the same weight on all parts of the earth's surface, owing to the fact that the force of gravity decreases as the square of the distance from the center of the earth increases. Weight is least at the Equator, since the earth bulges and centrifugal force is strongest at that place, and it is greatest at the poles, because the earth is flattened and centrifugal force is not a factor at those regions. A mass of iron which weighs 1,000 pounds at the Equator would weigh 1,005 pounds at either of the poles. The same mass would weigh 500 pounds at a point 2,000 miles below the surface of the earth and at an elevation of 1,650 miles above it, and the weight on the surface of the sun would be 28,000 pounds. However, the term weight in ordinary use does not imply the absolute heaviness of a body, but rather its heaviness as compared to a piece of metal which is taken as a standard. It will be seen from this that it is quite necessary to have a standard of weight, which is ascertained by an arbitrary rule, and the weighing is done at the same place and under the same conditions.

The *platform scale* is the most common weighing machine to ascertain the weight of large quantities. It makes use of a number of levers, all of which are connected with the last lever of the series, or principal lever, and this is connected by a long arm with the short arm of the weighing beam. Several weights of different denominations are fitted to be suspended from the weighing beam, which is also furnished by a sliding weight to balance the scales. Thaddeus Fairbanks of Vermont patented such a weighing machine, in 1831, and since then numerous modifications and improvements have been made. Weighing machines based on the principle of *even balance* are used to a considerable extent. These consist essentially of a beam balanced upon a pivot, and the object to be weighed is placed on one end while a weight is placed on the other extremity of the beam. Usually each end of the beam has a pan for receiving the weights or the objects to be weighed, and in some forms a side beam is utilized, as in many scales used by grocers. The *steelyard* and the *torsion balance* are other forms of instruments for weighing.

WEIGHTS AND MEASURES, the means employed to ascertain exact quantity. It is necessary to have systems to compare and express mass, or quantity, as a means of effecting the exchanges which are involved in commerce, and they are likewise indispensable in the arts and sciences. All governments maintain standards of such systems and the standard units are securely preserved at the capitals. The standards now in use have been chosen arbitrarily, though in particular cases some natural rule has been followed in determining the value of the units. This may be seen from the fact that the average length of the foot, twelve inches, was made the basis of the foot among the Greeks. On the other hand, the cubit of the Jews and the Egyptians was established upon the average length of the fore arm. A law in England, passed in 1266, made 32 grains of wheat taken from the middle of the ear the basis of the English penny, while 20 pence were declared to be an ounce, 12 ounces a pound, and 8 pounds a gallon of wine. A London bushel contained 8 gallons of wine.

Apothecaries' weight is used in buying and selling medicines by prescriptions, but *avoirdupois weight* is employed when the drugs are not ordered by prescription. All goods are bought and sold by avoirdupois weight, except for which *troy* and apothecaries' weight are used. The *short ton* of 2,000 pounds is used commonly in the United States, while the *British* or *long ton* is employed to some extent in that country and almost exclusively in Great Britain. The latter contains 2,240 pounds, corresponding to a cwt. of 112 and a quarter of 28 pounds. The common standard of weight by which the relative value of these systems are compared is the grain, which for this purpose may be regarded as the standard of weight. Both the pound troy and that of apothecaries' weight have each 5,760 grains, while the pound avoirdupois has 7,000 grains. Below are tables of the three systems of weight mentioned:

APOTHECARIES' WEIGHT.

Lb.	Oz.	Dr.	Scr.	Gr.
1	12	96	288	5,760
	1	8	24	480
		1	3	60
			1	20

AVOIRDUPOIS WEIGHT.

Gross or Long Ton.	Cwt.	Qr.	Lb.	Oz.	Dr.
1	20	80	2,240	35,840	573,440
	1	4	112	1,792	28,672
		1	28	448	7,168
			1	16	256
				1	16
Short or Net Ton.	**Cwt.**	**Qr.**	**Lb.**	**Oz.**	**Dr.**
1	20	80	2,000	32,000	512,000
	1	4	100	1,600	25,600
		1	25	400	6,400
			1	16	256
				1	16

TROY WEIGHT.

Lb.	Oz.	Dwt.	Gr.
1	12	240	5,760
	1	20	480
		1	24

7,000 troy grains = 1 lb. avoirdupois
175 troy pounds = 144 lb. avoirdupois
175 troy ounces = 192 oz. avoirdupois
437½ troy grains = 1 oz. avoirdupois
1 troy pound = .8228+ lb. avoirdupois

WEIMAR (vī′mär), a city in Germany, capital of the grand duchy of Saxe-Weimar, fifty miles southwest of Leipzig. It is beautifully situated on the Ilm River and has good railroad facilities, connecting it with the leading trade centers of Germany. The streets are finely improved by pavements, electric lights, gardens, and parks. It has systems of public waterworks and electric street railways. The most prominent buildings include the public library, with 225,000 volumes, the grand ducal palace, the Gothic townhall, the court theater, the Goethe museum, the Schiller house, and many fine schools and churches. Weimar is noted as the home of Schiller, Herder, Goethe, Wieland, and Lucas von Cranach (1472-1553), an eminent painter.

Among the adornments of the city are splendid monuments to Wieland, Schiller, Herder, and Goethe, and the last three mentioned writers were buried there. Tourists find the houses occupied by a number of these writers objects of special interest, including a number of rooms of the ducal palace, which has fine decorations and frescoes illustrating scenes from the works of these authors. Weimar has a number of manufactures, including pottery, porcelain, clothing, scientific instruments, and chemicals, but its trade is of a local character. Nearly all the inhabitants are Protestants. Population, 1915, 31,117.

WEIR (wēr), **Harrison William,** artist and author, born in Lewes, England, May 5, 1824; died Jan. 4, 1906. His ability as a designer on wood was developed at an early age, and he produced some fine specimens in wood engraving in 1840. He is noted principally for skill in painting, an art in which he was self-taught, and in 1849 exhibited his "Dead Shot" at the British Institution. He soon became a member of the Society of Painters in Water Colors, and as a member of that association took high rank in producing landscapes and paintings of animals, flowers, and country life. His best known works include "Christmas Carol," "A Servant of all Work," "The Forester," and "Startled." He illustrated many books and prepared wood engravings for periodicals. He is the author of several writings, including "Animal Stories," "Everyday in the Country," "Bird Stories," and "Our Cats."

WEIR, Robert Walter, painter, born in New Rochelle, N. Y., June 18, 1803; died in New York City, May 1, 1889. He first received instruction in New York City, but in 1824 proceeded to Italy, where he studied for several years. In 1829 he became a member of the National Academy of Design, and three years later was elected professor of drawing in the West Point Military Academy. After holding that position for 42 years, he retired to his residence in New York City. Among his best works are "Landing of Henry Hudson," "Embarkation of the Pilgrims," "Indian Captive," "Christ in the Garden," "Pier at Venice," "View of the Hudson from West Point," "Belle of the Carnival," "Virgil and Dante Crossing the Styx," and "Our Lord on the Mount of Olives."

WEISMANN (vīs′män), **August,** biologist and author, born in Frankfort-on-the-Main, Germany, Jan. 27, 1834. His father was professor of languages in the gymnasium, where he studied until 1852, when he entered the University of Göttingen. Subsequently he studied natural sciences in Vienna and Paris, and in 1861 became physician to Archduke Stephen of Austria. While engaged in that capacity, he published "Development of the Diptera," a work of much merit. Subsequently he took lectures on zoölogy in the University of Giessen and in 1866 became professor at Freiburg, in Briesgau. Weismann is noted for his extensive research in cell structure of the body and made many valuable discoveries in regard to germs, thus leading to his germinal theory. His writings include "Studies in the Theory of Descent," "Germinal Selection," "Germ-Plasm," "Essays on Heredity and Kindred Subjects," Mammalian Descent," and "Development of Sex-Cells in Lower Animals."

WELDING (wĕld′ĭng), the process by which two pieces of the same metal, at a suitable temperature, are made to unite permanently. Welding is confined chiefly to such metals as iron and platinum, but many other substances can be welded with facility, such as glass, horn, and tortoise shell. However, iron and steel are the only metals that are welded extensively in the arts. The process consists of cleaning the ends of the bars to be welded, when they are brought to a white heat, whereby they are softened. To prevent the formation of oxide, a quantity of borax, or some other flux, is put upon them. Having been brought to this suitable condition for welding, the heated ends are placed together and hammered, by which they are caused to unite so as to form sensibly but one mass, showing no appearance of the junction. Welding is done extensively in the larger shops by electricity. The heat is obtained by passing a strong electric current through the pieces of metal that are to be joined. By this process it is possible to weld copper quite as easily as iron. Pressure applied to two pieces of lead with fresh surfaces will cause them to adhere with considerable force. Powdered graphite in a dry condition may be consolidated into a coherent mass by great pressure, and the union is so complete that it may readily be cut into strips for use as lead pencils.

WELL, a deep hole of small diameter sunk into the earth for the purpose of obtaining various substances, such as water, natural gas, or petroleum. Wells for water are usually dug by hand with a spade where water is desired at no great depth, usually from ten to sixty feet. If water cannot be obtained at reasonable depths by digging, the wells are then made by boring or drilling. A well bored for water may be from six inches to two feet in diameter, but generally not more than 150 feet in depth, and the inside casing usually consists of ordinary well tile. On the other hand, drilled wells are frequently put down to great depths and usually range from 100 to 3,000 feet. They are cased in the inside with piping to prevent caving and pumps used in such wells are protected by screens. In most instances wells of this kind are lined with a casing that serves for the pump itself.

The machinery used in sinking wells by boring and drilling consists chiefly of a derrick, usually from thirty to seventy feet in height; a machine for boring or drilling, which consists of bits and drills to suit the size wanted; and a windlass for lowering and raising the drill. The machinery is operated either by horse or steam power, and steam or gasoline engines are usually employed where the well is to have considerable depth. In boring a well, the auger is turned by the engine or power acting upon the main rod, and, when the auger is filled with earth, it is raised by the windlass to be cleaned, after which it is again lowered for boring. Drilling is the only method by which wells can be sunk where the strata are hard and the depth is considerable. For this purpose a so-called *diamond drill* is used, with which it is possible to penetrate any rock, no matter how hard. Drills of this kind are generally used in prospecting for coal, iron ore, petroleum, and precious metals.

WELLAND (wĕl'lạnd), a river of Canada, in the Province of Ontario. It rises in southern Ontario and, after an easterly course of sixty miles, flows into the Niagara River a short distance above Niagara Falls. The Welland River is important for the reason that it is joined with the Welland Canal, thus forming a part of the system that passes around Niagara Falls and connects the navigation of Lake Ontario with that of Lake Erie. This canal is 15 feet deep, 160 feet wide, and 27 miles long. It has a total lift of 327 feet, which is possible by 25 locks. The town of Welland, capital of Welland County, is situated on the Welland Canal, near the Welland River, about twelve miles south of Saint Catharines. It is on the Grand Trunk, the Wabash, and the Michigan Central railroads. The place has a large trade in lumber and produce. It has manufactures of flour, machinery, and lumber products. Population, 1921, 8,654.

WELLES (wĕlz), **Gideon,** statesman, born in Glastonbury, Conn., July 1, 1802; died in Hartford, Conn., Feb. 11, 1878. After obtaining a general education, he studied law and in 1826 became editor of the Hartford *Times,* the chief organ of the Democratic party in Connecticut. He was a member of the Connecticut Legislature from 1827 to 1835 and served as State Comptroller for three years. While serving in the Legislature he secured the abolition of imprisonment for debt. President Polk appointed him chief of a bureau in the Navy Department, which position he filled from 1846 until 1849. When the Republican party was organized, Welles was one of its most ardent supporters. He served as Secretary of the Navy in the cabinets of Lincoln and Johnson, from 1861 to 1869. During a large part of the Civil War he maintained a coast blockade of about 2,000 miles, organized a fleet of ironclads and transports on the Mississippi River, and in various ways contributed to the naval victories of the North. He published "Memoirs of the War" and "Lincoln and Seward."

WELLESLEY (wĕlz'lĭ), a town in Norfolk County, Massachusetts, fifteen miles west of Boston, on the Boston and Albany Railroad. It is an attractive place, being well situated and improved by gardens, parks, and modern municipal facilities. The leading features include the Wellesley College, the Dana Hall, the Rockridge Hall, and the public library. It has systems of public waterworks and sanitary sewerage. Population, 1905, 6,189; in 1920, 6,224.

WELLESLEY, Richard Colley, Marquis of, statesman, born in Dublin, Ireland, June 20, 1760; died Sept. 26, 1842. He was the eldest son of the first Earl of Mornington, an Irish peer, and the eldest brother of the Duke of Wellington. After attending Eton College, he entered the University of Oxford, where he graduated in 1780, and on the death of his father, in 1781, became Earl of Mornington, taking his seat in the Irish House of Peers. He was elected to the British House of Commons, in 1784, and was soon after made Lord of the Treasury by Pitt. In 1797 he became a member of the House of Lords and the following year was made Governor General of India, where the French and Tippoo Sahib, a powerful prince, had formed an alliance against the British. His first success was the capture of a number of French officers, whom he sent to Europe, and afterward he invaded Mysore, capturing Seringapatam and slaying Tippoo Sahib in battle. It is due to the efficient services of Wellesley that England became the predominating influence in India. He founded the College of Fort William, built the palace of Calcutta, reformed the Indian civil service, and greatly extended the commercial and industrial enterprises.

Wellesley was sent to Spain as envoy in 1805, but Perceval made him Secretary of State for Foreign Affairs before the end of the same year. In 1821 he became Lord Lieutenant of

Ireland, in which position he tried to reconcile the Protestants and Catholics, but by this policy he lost the support of the Orangemen. When his brother, Wellington, opposed the Catholic Emancipation, he resigned the Lord Lieutenancy. Earl Grey appointed him to the office a second time, in 1833, but the ministry fell soon after and Wellesley retired from official life. His "Memoirs and Correspondence" was edited by R. R. Pearce.

WELLESLEY COLLEGE, an institution for the higher education of women, founded at Wellesley, Mass., by Henry Fowle Durant. It was established "for the purpose of furnishing to young women who desire to obtain a liberal education such advantages and facilities as are enjoyed in institutions of a higher class." It was incorporated by the Legislature of Massachusetts in 1870, was opened for students in 1875, and the first degrees were conferred in 1879. Situated in the beautiful town of Wellesley, 15 miles from Boston, endowed with extensive grounds which are diversified by hill, meadow, and lake, the institution combines the advantages of free and healthful country living with those which come from proximity to a great literary, artistic, and social center. It has two large halls of instruction and residence, nine smaller dormitories, a chapel, an art building, a music hall, a chemistry laboratory, an observatory, and several society houses and other buildings. The institution has no separate schools, but offers two courses, the undergraduate course leading to the degree of B. A. and the graduate course leading to the degree of M. A. It is affiliated with several institutions in Europe, including the zoölogical station at Naples and the American School of Classical Study at Athens and Rome. The faculty embraces 130 instructors and professors and the attendance is about 1,500 students. It has a library of more than 81,500 volumes.

WELLINGTON (wĕl'lĭng-tŭn), the capital of New Zealand, situated near the southern extremity of North Island, on Cook Strait. It has an excellent harbor and extensive steamboat and railway connections. The streets are spacious and well graded and paved. Among the chief buildings are the city hall, the customhouse and post office, the parliament building, the public library, Masonic Temple, and two fine cathedrals. It is the seat of Victoria College, which is affiliated with the University of New Zealand, and has several parks and botanical gardens. The manufactures include flour, leather, soap, boots and shoes, sailing vessels, vehicles, earthenware, preserved meat and fish, clothing, and machinery. It has a growing trade in cereals, coffee, live stock, and merchandise. The first settlement of New Zealand was made near Wellington in 1839. Population, 1921, 70,729.

WELLINGTON, Arthur Wellesley, Duke of, eminent military leader, born at Dangan Castle, Ireland, May 1, 1769; died Sept. 14, 1852. He was a brother of Richard Colley Wellesley and the third son of the first Earl of Mornington. After studying at Eton and Brighton, he took a course in military science at Angers, France. In 1787 he entered the army as ensign and in 1793 secured the lieutenant colonelcy of the thirty-third regiment. His first service in actual military life was in 1794 and 1795, when General Pichegru drove the English army under the Duke of York out of Holland. He was sent to India in 1796 and arrived at Calcutta in the spring of 1797. In the following year his brother reached India as Governor General, and it was largely due to the successes of Wellington against Tippoo Sahib that the former succeeded in making India British. Failing health required him to return to Europe in 1805, where he was soon after appointed on an expedition into Hanover and Denmark.

He was elected to Parliament in 1806, when he also married Lady Catharine Pakenham, third daughter of the Earl of Longford, and in 1807 became chief secretary for Ireland. In 1808 he received the principal command of the peninsular army in Portugal, whence he was dispatched to expel the French, and defeated the latter under General Junot in the Battle of Vimeira. He won the Battle of Talavera on July 28, 1809, and soon followed it with a long list of victories, for which he was created a peer and became known as Viscount Wellington. Having been made commander in chief of the army in Spain, as he had previously been of the army in Portugal, he pursued the French with such vigor that Parliament raised him to the dignity of marquis and voted him $500,000 for the purchase of an estate. In 1813 he won the Battle of Vittoria and was made field marshal, and the same year won battles in the Pyrenees, captured San Sebastian, and invaded France. He won the Battle of Orthez, in 1814, and followed it by defeating the French under General Soult at Toulouse, thus annihilating the opposing army in the peninsula. These successes caused Parliament to vote him thanks for the twelfth time and to present him with $2,000,000. Napoleon having abdicated, the war closed, and Wellington became ambassador to France, but soon after succeeded Lord Castlereagh as representative in the Congress of Vienna.

Wellington was again put in command of the British forces when Napoleon escaped from Elba. In conjunction with Blücher, the Battle of Waterloo was won, on June 18, 1815, thus ending the military career of Napoleon. He was commander of the army that occupied Paris for several years, and, on returning to England, received a further gift of $1,000,000. In 1819 he became a member of the Cabinet under Lord Liverpool, represented Great Britain in the Congress of Vienna in 1822, and was made high constable of the Tower in 1826. He superseded

the Duke of York as chief commander of the forces, in 1827, and the following year became Premier of England. In that position he opposed the Catholic Emancipation and other reforms, thereby becoming so unpopular that his life was endangered by assaults from mobs. However, in 1829, as a means to avert a war with Ireland, he forced the Catholic Emancipation Act through Parliament. Later he was partially restored to popular favor by supporting the movement in favor of the repeal of the Corn Laws. In 1846 he retired from active public life. Wellington was buried under the dome of Saint Paul's Church, where a monument has been erected to his honor. Many biographies treating of his life have been published.

WELLINGTON, county seat of Sumner County, Kansas, 30 miles south of Wichita, on Slate Creek and on the Santa Fé and other railroads. It has railroad shops, flour mills, and grain elevators. The chief buildings include the courthouse, high school, Masonic Temple, and postoffice. It was settled in 1871 and incorporated in 1872. Population, 1920, 7,048.

WELLMAN, Walter, journalist and explorer, born at Mentor, Ohio, Nov. 3, 1858. He attended the common schools of his native State, founded the Cincinnati *Evening Post* in 1869, and in 1884 became correspondent for the Chicago *Herald* and other newspapers. He went to the Bahama Islands in 1892 and located the landing place of Columbus on Watling Island, marking the spot with a monument. In 1894 he conducted an expedition to the Arctic regions, reaching a point northeast of Spitzbergen. A second expedition to the Arctic region was undertaken by him in 1898, and the following year he discovered a number of new islands in the vicinity of Franz-Josef Land. He established an outpost near the eighty-first parallel, at Cape Heller, from which point he undertook to sail rapidly toward the north to reach the North Pole, but an accident near the eighty-second parallel compelled him to retreat. Besides corresponding for a number of newspapers, he published numerous articles in *McClure's Magazine* and the *Century Magazine*. He was one of the first to advocate the theory that the North Pole can be reached best by means of aërial navigation, and in 1905 published a number of articles giving advanced views upon this subject. Later, in 1908 and 1909, he undertook to sail to the North Pole in an airship, but the enterprise did not prove successful.

WELLS, David Ames, economist, born in Springfield, Mass., June 17, 1828; died Nov. 5, 1898. He is eminent as an advocate of free trade and as the author of many excellent treatises on financial and economical subjects. In 1867 he was commissioned by the United States government to visit Europe with the view of inspecting and reporting on competitive industries. He was made an associate of the French Academy, in 1874, and was otherwise honored by numerous foreign societies and universities. His writings include "Science of Common Things," "Elements of Natural Philosophy," "First Principles of Geology," "Practical Economics," "Production and Distribution of Wealth," "Relation of the Tariff to Wages," "Our Merchant Marine," and "Principles of Taxation."

WELLSTON, a city of St. Louis County, Mo., near St. Louis, on the Wabash Railroad. It has a fine high school, city hall, and many churches. The place is popular as a residential center. It was settled in 1862. Pop., 1920, 8,680.

WELLSTON, (wĕlz'tŭn), a city of Ohio, in Jackson County, about 100 miles east of Cincinnati, on the Detroit Southern, the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton and Dayton, and other railroads. Electric railways, street pavements, waterworks, and sanitary sewerage are among the improvements. It was settled in 1871 and incorporated in 1876. Population, 1900, 8,045; in 1920, 6,687.

WELLSVILLE, a city of Ohio, in Columbiana County, 38 miles north of Wheeling, W. Va. It is situated on the Ohio River, 48 miles below Pittsburg, and is on the Pennslyvania Railroad. Coal and fire clay are obtained in the vicinity. It has manufactures of brick, pottery, hardware, flour and grist, leather belting, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. It has a public library, a fine high school, and several well-built churches. Population, 1920, 8,849.

WELWITSCHIA (wĕl-wĭch'ĭ-ȧ), a plant found in the desert regions of South Africa. It was so named from Friedrich Welwitsch (1806-1872), a German botanist. The plant is represented by a single species, which somewhat resembles a giant radish. The stem is not more than two or three feet high, but develops so as to be as much as twelve feet in circumference. Two long and leathery leaves spring from the main root, and these frequently become torn and dry, but no other leaves appear. However, short flower stocks spring from the base of these leaves from year to year. Botanists estimate that some of these plants subsist for more than a century.

WENER (vā'nĕr), or **Vener**, the largest lake in Sweden, which is next in size to lakes Onega and Ladoga in Russia, hence it is the third lake of Europe. It is situated 150 miles southwest of Stockholm. The elevation above the sea is 150 feet and its greatest depth 310 feet. The lake is 90 miles long, is from 10 to 50 miles wide, and has an area of 2,010 square miles. It receives the overflow from several smaller lakes and the outlet into the Cattegat is by the Göta River. The lake has fine fisheries and in its vicinity are valuable forests. A canal connects it with Lake Wetter. It has canal connections with the Baltic Sea and the Cattegat.

WERDER (vĕr′dĕr), **August**, general, born at Schlossberg, Germany, Sept. 12, 1808; died Sept. 12, 1887. He joined the army of Prussia in 1825. From 1842 until 1843 he engaged in the Russian campaigns in the Caucasus, after which he was raised to the rank of lieutenant general, and in the war of 1866 commanded a division against Austria, taking a prominent part in the Battle of Sadowa. He was a member of the staff of the Crown Prince at the beginning of the Franco-German War, in 1870, but soon received command of a corps. Later he conducted the siege of Strassburg, where he repulsed the French in several attacks. A large grant was given to him for valued service, together with the insignia of the order of the Black Eagle, and a statue was erected to his honor at Freiburg. He retired from the army in 1879.

WERNER (vĕr′nĕr), **Reinhold von**, admiral and writer, born at Weferlingen, Germany, May 10, 1825. He was trained for service in the national navy and in 1849 became an officer in the reorganized fleet of the German nation. He joined the navy of Prussia in 1852, commanded in the war against Denmark in 1864, and during the Seven Weeks' War rendered efficient service on the North Sea by seizing the ports of Hanover, which had been greatly strengthened by the allies of Austria. In 1875 he was made rear admiral and was ennobled in 1901. For some years he published the *Hansa* at Hamburg, a magazine devoted to seamanship. His books include "Recollections and Pictures of Sea-life," "The Prussian Expedition to China, Japan, and Siam," "Three Months on the Slave Coast," "History of German Naval Wars from Germanicus to William II.," and "The Practical School of Sea-life." He died Mar. 15, 1909.

WERWOLF (wĕr′wo͝olf), or **Werewolf**, a man who was supposed to be able to convert himself into a wolf. It was an old superstition of many countries, especially among Germanic and Scandinavian peoples, that such persons existed. A werwolf, while in the form of a wolf, was supposed to possess all the powers and appetites of that animal. He was thought to be particularly fond of human flesh, hence he was much dreaded by the ignorant and superstitious. The belief in beings of this kind spread to Ireland, where it was thought that men existed who were not of one skin. Later the belief in werwolves was carried to France. In the latter country it was supposed that these beings carried off children.

WESER (vā′zĕr), a river of Germany, which is formed by the Fulda and Werra rivers a short distance southwest of the Hartz Mountains, and, after a course of 260 miles toward the northwest, flows into the North Sea. A canal connects it with the Elbe. Bremen and Bremerhaven are the chief cities on its banks. The tributaries include the Aller and Hunte.

WESLEY (wĕs′lĭ), **Charles**, clergyman, born in Epworth, England, Dec. 18, 1708; died March 29, 1788. He was a brother of John Wesley and was educated at Westminster School and Oxford University. From 1735 to 1736 he was with his brother John in Georgia, where he served as secretary to Governor Oglethorpe. He returned to England in the latter year and greatly assisted his brother in evangelistic work and in establishing the Methodist faith. Though not gifted with the personal magnetism and oratorial power of his brother, he rendered valuable service to the movement in writing numerous beautiful hymns. Many of his songs rank among the best and most admired in the English language. They include the immortal hymn, "O, for a Thousand Tongues to Sing!" The total number of hymns written by him is given at 6,100, of which about 2,000 were left in manuscript. He published "Sermons with Memoir."

WESLEY, John, famous clergyman and founder of Wesleyan Methodism, born in Epworth, England, June 17, 1703; died in London, March 2, 1791. His father, Samuel Wesley (1690-1739), was a clergyman at Epworth and a distant relative of Arthur Wellesley, Duke of Wellington. He entered Charter House school in 1714 and in 1724 graduated from Oxford University. In 1726 he was made a fellow at Lincoln College, Oxford, became a pastor in 1728, and in 1735 joined the colonists in Georgia as a preacher and missionary. After spending two years with the colonists and on missionary work to the Indians, he returned to England, where he became interested in studying the doctrine of the Moravians. He had been impressed with the views of the Moravians while on his journey to America, but in 1738 visited Herrnhut, the Moravian settlement in Germany, and became greatly interested in their doctrines. While there he was influenced in several matters of faith by Zinzendorf. His brother, Charles Wesley, soon joined him in the work that led to the founding of the Wesleyan Methodist faith, the name *Methodism* being derived from the strict and methodical habits of his sympathizers.

Wesley began holding open air meetings in 1739, in which he was associated with Whitefield, and not infrequently delivered 800 sermons per year. Thousands of earnest listeners attended his meetings, which were always made interesting by fine singing and an earnest and able exposition of Bible truths. Few laborers in the Christian cause have exceeded Wesley as incessant workers. It was not uncommon for him to travel thirty to sixty miles in a day, deliver two or three sermons, and write and read while making the journey. His success in arousing thought may be attributed to his unrivaled personal magnetism, powerful oratory, and methodical plans and perseverance in carrying forward his work. In 1750 he married Mrs. Vizelle, a widow with four children, but the union did not prove a happy one and separation finally fol-

lowed. He wrote many works on religious themes, published a number of original hymns, and translated several songs from the German. Though the founder of a distinct faith, he never formally separated from the Church of England. His chief writings include "A Calm Address to Our American Colonies," "Notes on the Old and New Testaments," "The Doctrine of Original Sin," "Survey of the Wisdom of God in Creation," and "Preservative against Unsettled Notions in Religion."

WESLEYAN UNIVERSITY, an institution of higher learning at Middletown, Conn., established under the patronage of the Methodist Episcopal Church in 1829. A class of six students graduated from the institution in 1833, and it takes rank as the pioneer college of that denomination in America. The courses include classics, sciences, theology, philosophy, and literature. Though coeducational, the number of women admitted in any year is limited to twenty per cent. of the enrollment for the preceding year. The value of the property is placed at $2,500,000. It has a library of 65,000 volumes, a faculty of 40 instructors, and an attendance of 450 students.

WEST, Benjamin, painter, born in Springfield, Pa., Oct. 10, 1738; died in London, England, March 11, 1820. He descended from a family of Quakers. His first painting was a portrait of a baby sister lying in the cradle, which he executed when only seven years old, using colors made from berries and a brush of hairs taken from a cat's tail. In 1756 he established himself as a portrait painter in Philadelphia, but soon after removed to New York, where he attained considerable success. He went to Italy in 1760 to study art, and in 1763 settled in London as a portrait and historical painter. There he was liberally patronized by many famous men, including George III., who made him his historical painter. He joined three other painters in 1768 in founding the Royal Academy, of which he became president in 1792, an office held by him for 28 years. Most of his paintings are historical, but he painted many scenes based on the Scripture and a large number of portraits. The entire productions somewhat exceed 400. He painted "Christ Healing the Sick" when 65 years of age, which was purchased by the British Institution for $15,000. Other paintings of note include "The Return of the Prodigal Son," "Hector and Andromache," "The Death of General Wolfe," "The Battle of La Hogue," "Death on the Pale Horse," "The Crucifixion," "Agrippina," and "Installation of the Order of the Garder."

WEST BAY CITY, formerly a city of Michigan, in Bay County, five miles south of Saginaw Bay, on the Detroit and Mackinac, the Grand Trunk, and the Michigan Central railroads. It is finely situated at the mouth of the Saginaw River. Across the river is Bay City, to which it was annexed in 1905. The features include the public library, the high school, and many large business blocks. Among the manufactures are ironware, furniture, machinery, clothing, salt, lumber products, and sailing vessels. The city is lighted by gas and electricity, has an extensive system of street railways, and is the center of a large interior and lake trade. It has public waterworks, street pavements, and sewerage. Population, 1914, 12,997.

WESTBORO (wĕst'bŭr-ō), a town of Massachusetts, in Worcester County, 12 miles east of Worcester, on the Boston and Albany Railroad. It has a number of fine public schools, the Lyman Reform School, a public library, and a hospital for the insane. The manufactures include automobiles, clothing, machinery, boots and shoes, earthenware, and rubber goods. It has electric lighting and municipally owned waterworks. The first settlement in its vicinity was made in 1659, when it became known as Chauncy, and was incorporated as a town in 1717. Population, 1905, 5,378; in 1920, 5,789.

WESTBROOK (wĕst'brŏŏk), a city of Maine, in Cumberland County, at the junction of the Stroudwater and Presumpscot rivers, six miles northwest of Portland. It is on the Maine Central and the Boston and Maine railroads. Among the noteworthy buildings are the public high school, several parochial schools, a number of fine churches, and the Walker Memorial Library. The chief manufactures are silk and woolen textiles, paper, clothing, and machinery. It has waterworks, street pavements, and electric railroad connections with Portland. The trade is largely in cereals, manufactures, and merchandise. It was incorporated as a town in 1814 and became a city in 1891. Population, 1900, 7,283; in 1920, 9,435.

WEST CHESTER (chĕs'tĕr), a city in Pennsylvania, county seat of Chester County, 27 miles west of Philadelphia, on the Pennsylvania and the Baltimore and Washington railroads. It is surrounded by a fertile farming and dairying region. The noteworthy buildings include the county courthouse, the public library, the Chester County Hospital, the Friends' School, the Turk's Head Hotel, the Darlington Seminary, and the West Chester State Normal School. Marshall Square contains a botanical collection. The manufactures embrace flour, hosiery, machinery, soap, hardware and farming implements. It was founded in 1784 and chartered as a borough in 1799. Population, 1920, 11,717.

WESTERLY (wĕst'ĕr-lĭ), a town of Rhode Island, in Washington County, on the Pawcatuck River, five miles north of Long Island Sound. It is on the New York, New Haven and Hartford Railroad. In the surrounding country are extensive quarries, which produce the well-known *Westerly granite.* Among the features are the fine public library, the high school, many large churches, and the Soldiers' Memorial

building. It has manufactures of flour, cotton and woolen goods, carriages, medicines, clothing, and machinery. The public utilities include electric street railways, waterworks, and sanitary sewerage. Although it was first known as Misquamicutt, it was incorporated as Westerly in 1669. Population, 1905, 8,381; in 1920, 9,952.

WESTERN AUSTRALIA, the largest State of the Commonwealth of Australia, comprising the entire western third of the continent. It is bounded on the north, west, and south by the Indian Ocean and the eastern boundary is formed by South Australia. The length from north to south is about 1,450 miles, the breadth is 950 miles, and the area is 975,920 square miles.

DESCRIPTION. The surface is of an undulating character, but the general elevation is not high above the sea. Much of the surface consists of sand or sandstone plateaus. Fertile regions lie along the coast and in the southwest, where vegetation is extensive, and the interior is occupied largely by the Victoria Desert. Several mountain ranges diversify the surface, including the Victoria, Darling, and Herschel ranges, but their heights do not exceed from 2,500 to 3,825 feet. The Kimberley District, in the northern part, consists of elevated plains through which deep ravines have been cut by the action of streams. As a whole the coast is quite regular, with small indentations, such as Shark's Bay, Exmouth Gulf, and King Sound. Many small islands lie off the coast.

The drainage is chiefly toward the west, and all of the southern part is without a river. Rainfall in the interior is so scant that it does not exceed the natural evaporation, hence the water sinks into the ground or is carried by short streams into lakes that have no outlet. Among the chief rivers flowing west are the Fitzroy, the DeGrey, the Ashburton, the Gascoyne, and the Murchison. Many salt lakes are located in the west central part, but none of them has an outlet to the sea. These include Austin, Carey, Barlee, Moore, and Monger lakes. Sterile tracts of sandy wastes and numerous salt marshes abound in the region of the lakes, but many sections contain good grazing lands. Most of the lakes become mud flats during the dry season, when they are covered with beds of salt.

The climate in general is very dry, but it is healthful and quite pleasant. Slight frosts occur in winter. The summer heat is usually from 70° to 90°, though the thermometer may rise to 112°. Rainfall is from six to ten inches in the interior, but along the coast it ranges from fifteen to forty inches. A scarcity of precipitation renders it almost impossible to secure wells in many parts of the interior, thus necessitating the construction of cisterns to preserve water for the dry season, or the movement of stock toward the coastal districts. Fine forests abound in the southwestern section, where many trees attain an enormous size, such as the sandalwood, karri, tuart, and eucalyptus. Other trees include the baobab, red gum, pepper bark, mangrove, and grass trees.

MINING. The State is rich in mineral deposits. Gold has been mined in the Kimberley District since 1882 and in the Yilgarn District since 1887, and the output of this mineral is now greater than in any other subdivision of the continent. At present the production of gold is about half of the total output obtained in the continent. Clays suitable for brick and pottery are abundant, and granite, limestone, and sandstone are widely distributed. Other minerals include silver, lead, zinc, tin, iron, copper, salt and plumbago. The prospects for development in mining are very great.

AGRICULTURE. The arable portion of Western Australia is better adapted to agriculture and stock raising than any other part of the continent, this being due to the fact that rainfall is certain. However, progress in these enterprises has been made only along the southwestern coast, since the vast interior does not have sufficient moisture to mature the crops. Farming has developed materially since the mining interests have extended. Wheat is the leading cereal and both wheat and oats are cut to some extent for hay. Other products include tobacco, barley, sugar beets, rye, vegetables, and fruits. Large areas are suitable for grazing, but the pastoral industry is seriously limited on account of the difficulty in obtaining water. Sheep are grown more extensively than any other class of domestic animals, but the interests in cattle and horses are large. Camels are reared for use as beasts of draft and burden. The culture of silk and the mulberry tree has been introduced successfully.

TRANSPORTATION. None of the rivers is navigable and few harbors are afforded by the coast. Railroad building has been confined chiefly to the southwestern part, with Perth as the leading railway center. The lines of railways in operation include a total of 3,475 miles, the larger part of which is owned and operated by the government. Highways have been built and are maintained in the more generally settled portions. Telephones are in general use and the telegraph lines include a total of 14,500 miles. The exports include minerals, pearls, timber, wool, cured and canned fish, cereals, live stock, and hides. Among the leading imports are clothing, tea, chemicals, spirits, and machinery.

MANUFACTURES. The manufacturing enterprises are connected largely with the mines and lumber industries. Flour and grist are produced extensively and considerable interests are vested in canning fruits and fish and in tanning hides. Extensive machine shops are located at Perth, but these are devoted chiefly to the manufacture of implements and in reconstructing and repairing in connection with railway trans-

portation. Among the general manufactures are clothing, pottery, canned fruit and fish, cigars, furniture, and clothing.

GOVERNMENT. The Governor is appointed by the British crown, and he exercises general executive power through a responsible minister. Legislative authority is vested in a Parliament of two branches, the legislative council of thirty members and the legislative assembly of fifty members. Representatives in both departments are elected by popular vote without distinction of sex, the councilors for six years and the assemblymen for three years. The right of suffrage is based upon a property qualification. Local government is administered by counties, municipalities, and towns.

EDUCATION. Public schools are maintained in all the settled portions, at which attendance is free, but compulsory between the ages of six and fourteen. Instruction in the public schools is secular, but religious training may be given by clergymen of the same denomination as the parents of the children. Numerous secondary schools are maintained in the larger towns. Perth is the seat of the university. A number of parochial schools and educational associations of various kinds are in a flourishing condition.

INHABITANTS. The State is one of the most sparsely settled regions in the world. Nearly all the settlements are confined to the coast and in the mining districts. The larger number of inhabitants are British or of British descent, and the Anglican Church has a larger membership than any other. Among the leading denominations, besides the Anglicans, are the Roman Catholics, Methodists, and Presbyterians. Perth, in the southwestern part, is the capital and largest city. Other cities include Fremantle, Kalgoorile, Boulder, Coolgardie, and York. In 1921 the State had a population of 332,213.

HISTORY. The western coast of Australia was first visited by the Portugese in the 16th century. Dutch explorers surveyed the northern coast about a century later. In 1825, the first settlement was established within the present confines of Western Australia by the English, who took official possession of the region two years later. Large grants of land were made to companies in 1829, with the view of colonizing the country, and several thousand convicts from Sydney came with the early settlers. The discovery of gold, in 1882, brought a large number of prospectors to the Kimberley District, and after 1890 the immigration became extensive. Western Australia long opposed the formation of the Commonwealth of Australia, but it finally agreed to that project in 1900. The extensive development of mining and agriculture are contributing to the rapid growth in wealth and population.

WESTERN RESERVE UNIVERSITY, an institution of higher learning at Cleveland, Ohio, founded at Hudson in 1826 as the Western Reserve College. It was removed to Cleveland in 1882 and renamed Adelbert College. The College for Women was established in 1888. Four years later, in 1892, the Department of Graduate Instruction was founded by the faculties of Adelbert College and the College for Women. Adelbert College and the College for Women are located on Euclid Avenue, adjacent to Wade Park and the boulevard system. The Medical College, founded in 1843, is the third oldest institution of its class west of the Alleghenies. Other departments include the Law School, opened in 1892, the Library School, founded in 1894, and the Dental Department, which is located down-town. At present the total enrollment averages about 2,200 and the faculty consists of 313 instructors and officers. The libraries of the university contain about 95,000 volumes. It has endowments valued at $1,500,000, an income of $300,000, and property valued at $2,850,000.

WESTFIELD (wĕst'fēld), a town of Massachusetts, in Hampden County, on the Westfield River, ten miles west of Springfield. Communication is furnished by the Boston and Albany and the New York, New Haven and Hartford railroads. It is surrounded by a fertile farming and dairying region. Among the notable buildings are the Noble Hospital, the Westfield Athenaeum, and the State Normal School. It has electric street railways, pavements, waterworks, and several libraries. The manufactures include cigars, baskets, paper, whips, textile fabrics, thread, and machinery. It has a growing trade in farm produce and merchandise. Westfield was settled in 1642 and incorporated in 1669. Population, 1905, 13,611; in 1920, 18,603.

WESTFIELD, a village of New Jersey, in Union County, seven miles west of Elizabeth, on the Central of New Jersey Railroad. The manufactures include clothing, utensils, and machinery. Electric lighting, waterworks, and macadamized streets are among the improvements. Population, 1920, 9,026.

WEST HAMMOND, a city of Cook County, Ill., 20 miles south of Chicago, on the Pennsylvania and other railroads. It has extensive manufactures of glue, grain products, and machinery. The chief buildings include the high school and several churches. Pop., 1920, 7,482.

WEST HAVEN, a borough of Connecticut, in New Haven County, separated from New Haven by the West River. It is on the New York, Hartford and New Haven Railroad and is popular as a residential center. The place was a part of New Haven until 1822, when it was united with North Milford. Population, 1910, 8,543; in 1920, 12,369.

WEST HOBOKEN (hō'bō-kĕn), a town of New Jersey, in Hudson County, near Hoboken and two miles west of New York City. It has railroad and electric railway facilities. The features include the public library, the high

school, the Monastery of the Passionist Fathers, the Masonic Temple, the Catholic theological seminary, and the Convent of the Sisters of Dominic. It has manufactures of clothing, silk textiles, furniture, gloves, and machinery. Large quantities of flowers are cultivated in the vicinity. It was a part of Bergen until 1861, when it was incorporated under the present name. Population, 1905, 29,082; in 1920, 40,068.

WEST INDIES (ĭn'dēz), or **Antilles** (ăntĭl'lēz), an island archipelago of America, extending from the extremity of Florida to the northern coast of Venezuela. It lies between the Gulf of Mexico and the Caribbean Sea on the west and the Atlantic Ocean on the east.



About 1,000 islands are included in the group, ranging from small islets to Cuba, which is the largest of the islands. The archipelago may be divided into four groups: the Greater Antilles, the Lesser Antilles, the Bahama Islands, and the Virgin Islands. Since these groups and a number of the more important islands are described in special articles, it is intended in this article to call attention to only a few general characteristics.

The Greater Antilles comprise the four largest islands of the West Indies, including Jamaica, Porto Rico, Hayti, and Cuba. The Lesser Antilles lie between the northeastern part of Venezuela and Porto Rico, forming an extensive chain of islands and islets. On the other hand, the Virgin Islands form a connecting link between the Greater and Lesser Antilles, lying northeast of Porto Rico, and the Bahama Islands are southeast of Florida. These islands lie within the Torrid Zone, except the Bahama group, which is situated mostly north of the Tropic of Cancer. The area is estimated at 93,575 square miles, and of this land surface about 82,575 square miles are included in the Greater Antilles.

The West Indies are largely of volcanic origin, probably embracing the summits of a submerged mountain system, but the Bahamas and a number of individual islands are of coral formation. The latter are generally low and level, but those of volcanic origin have peaks towering from 5,000 to 8,550 feet above sea level. Marked differences prevail in the climatic conditions of the islands, largely because of much diversity in elevation and in their situation in latitude. Those having an elevated surface are generally favorable to Europeans, while those lying near sea level are excessively hot in the summer season. Hurricanes and storms are quite frequent. Insects, reptiles and birds are well represented by many species. The group as a whole has considerable mineral wealth in gold, silver, lead, coal, iron, copper, tin, manganese, limestone, and granite. Among the chief productions are tobacco, cotton, sugar, rum, coffee, maize, potatoes, yams, pineapples, lemons, oranges, citron, pomegranates, manioc, indigo, pepper, aloes, sassafras, and other tropical products. Horses, cattle, sheep, swine, mules, and poultry are grown in abundance. The islands yield large quantities of valuable timber.

Columbus first saw land in America by discovering San Salvador, an island of the West Indies. The archipelago was so named by a company of Dutch traders, who also had interests in the East Indies. Carib and Arawak Indians inhabited the islands at the time of the discovery, but they were enslaved by the Spaniards and were largely exterminated. Slave labor being highly profitable in the sugar and tobacco plantations, many Africans were imported by English and other slave traders. The present inhabitants descended largely from the early natives, Africans, and Spaniards, but now many Americans and Europeans are found on the different islands. Spain gradually lost influence in the archipelago, owing to wars with the French, English, and natives, and in 1898 the last possessions were surrendered as a result of the Spanish-American War. Porto Rico belongs to the United States; Cuba and Hayti are



WESTMINSTER ABBEY

Westminster Abbey, founded in the 7th century and rebuilt by Edward the Confessor (1049-65), dates in its present form from the 13th century. For hundreds of years it has been the burial place of England's greatest dead, kings, peers, or commoners. The Poet's Corner records the most famous names in English literature.

independent republics; and Jamaica, Trinidad, and several smaller islands belong to Great Britain. The United States, France, Netherlands, and Venezuela have possessions in these islands. See **Danish West Indies.**

WESTINGHOUSE (wĕs'tĭng-hous), **George,** inventor and manufacturer, born at Central Bridge, N. Y., Oct. 6, 1846; died Mar. 12, 1914. He studied at Schenectady, where his father was a large manufacturer of agricultural machinery, and soon demonstrated inventive and mechanical genius in his father's machine shop. In 1865 he invented a railway frog for replacing cars on the track and other railway appliances. His greatest achievement was the invention of the famous Westinghouse air brake (q. v.), which he afterward greatly improved, and it is now used very extensively. He is the inventor of several steam and gas engines, steam turbines, and safety devices useful in railroading. Subsequently he became interested in electricity and acquired patents on electrical alternating current machinery, by which it became possible to develop the use of water power for long distances, and which led to the establishment of the great generators at Niagara Falls and those for elevated railroads in New York and Chicago. He established workshops for the manufacture of air brakes and electrical and steam machinery in France, Germany, and Great Britain. The company founded by him is capitalized at $75,000,000 and gives employment to 20,000 people. Many governments and numerous scientific societies bestowed honors upon him, among others the Order of Leopold of Belgium, the Royal Crown of Italy, and the Legion of Honor of France. In 1905 he was elected one of the trustees of the Equitable Life Insurance Society of the United States.

WESTMINSTER ABBEY (wĕst'mĭn-stĕr ăb'bў), the famous church in Westminster, which was formerly a distinct city of Middlesex, England. It is now united with London, though separate local jurisdictions are maintained. Westminster Abbey is one of the chief ornaments of London and is famous as the coronation place of the English sovereigns. The first building to be erected on its site was a church built in the 7th century under Sebert, King of the East Saxons, but subsequently an abbey took its place, which was named Westminster to distinguish it from Saint Paul's, or Eastminster. In 1065 the first stone church was erected here by Edward the Confessor and a part of it still remains, the preserved portion being known as the Pyx-House. The main structure dates from 1220, when Henry III. built the choir and transepts, but the principal building was not completed until in the reign of Edward I. Richard III. added the west front. About the same time were built the nave and aisles and the Jerusalem chamber, while Henry VII. erected the chapel which bears his name. Sir Christopher Wren designed the upper parts of the two western towers.

The Church of Westminster is 531 feet long, its roof is 212 feet high, and its towers are 225 feet above the foundation. It has been the place of coronation since the time of Edward I., who brought from Scotland the coronation stone on which the kings of Scotland had been crowned. All the English kings from Edward the Confessor to George II. were buried at Westminster Abbey. In the *Poet's Corner,* on the east aisle of the south transept, are memorials to all the most eminent English writers from Chaucer down. Among the excellent monuments are those erected to Canning, Pitt, Chatham, Fox, Watt, Stephenson, and other famous statesmen and inventors. The Westminster School is a famous institution of Westminster and is one of the seven noted public schools of England. It was founded in 1560. Among the eminent masters and pupils of this institution are Jonson, Cowper, Dryden, Halifax, Wren, Hastings, and Gibbon.

WESTMINSTER HALL, the large hall of the former palace of Westminster, now used as a vestibule to the British Houses of Parliament, in London. It was erected during the reign of Richard II., about 1398, when it succeeded a number of government buildings that had been destroyed by fire. As the structure now stands, it is 68 feet wide, 90 feet high, and 290 feet long. The roof is made of carved timber and the structure is ornamented by a fine porch. In historical associations it may be said to be the foremost hall of England. It is the place where Richard II. was deposed, Charles I. received his death sentence, and the trials of Warren Hastings, Chancellor More, and Lady Jane Grey were held. Here Cromwell was installed as Protector. The hall served for great public festivals during the coronation ceremonies and when the lord mayor of London was sworn into office.

WEST NEW YORK, a town of New Jersey, in Hudson County, situated near West Hoboken, with which it is connected by electric railways. The industries consist chiefly of silk manufactures, machine shops, and cotton and woolen mills. It has an extensive system of waterworks, systems of electric and gas lighting, and a large trade in merchandise and manufactures. Population, 1920, 29,926.

WEST ORANGE (ŏr'ĕnj), a town of New Jersey, in Essex County, twelve miles west of New York City. It is on the Erie and the Delaware, Lackawanna and Western railways. The town occupies a fine site along the slope of Orange Mountain. A fine view of New York City is afforded by Eagle Rock, an elevation of 600 feet. The streets are well paved and lighted. Llewellyn Park, a fine public resort, contains 750 acres. The manufactures include carriages, clothing, furniture, and electrical appliances.

West Orange is popular as a residential center. Population, 1905, 7,872; in 1920, 15,573.

WESTPHALIA (wĕst-fā'lĭ-ȧ), a province of Germany, in the western part of Prussia, lying south of Hanover and east of the Netherlands. The length from east to west is 125 miles; width, 108 miles; and area, 7,810 square miles. The northwestern part has a level surface, while the southern part is largely of an undulating character, being formed of hills and valleys. Most of the province is highly fertile, especially the western part, which resembles the eastern portion of the Netherlands. It has extensive mineral deposits, especially coal and iron. Other minerals include sulphur, copper, salt, petroleum, zinc, limestone, and sandstone. Manufacturing enterprises have been developed to a high degree of perfection, especially those devoted to the production of furniture, iron and steel, linen and woolen goods, chemicals, silk fabrics, machinery, pottery, and clothing. Westphalia is noted for its agricultural wealth, particularly for its yield of wheat, rye, flax, hemp, vegetables, and fruits. Hogs, cattle, horses, goats, and poultry comprise the domestic animals, yielding dairy products, cured meats, and hides.

Westphalia has a large number of railroads, but likewise has transportation by the Lippe and Ems rivers and by several canals. The inhabitants are descendants from the Saxons, who settled here from the vicinity of the Elbe shortly after the beginning of the Christian era. Charlemagne added the region to his dominion, but shortly after his death it became subject to the dukes of Lower Saxony. In 1179 it was made a part of the German Empire and until 1802 belonged to the Cologne electorate, when it came under the government of the Hesse-Darmstadt family. Napoleon organized the kingdom of Westphalia, which included the present Westphalia and several adjacent states, and placed his brother, Jérôme, on the throne. The kingdom was abolished after the Battle of Leipsic and the Treaty of Vienna incorporated the region with Prussia. The Thirty Years' War was ended in 1648 by the Treaty of Westphalia, which was concluded at Münster and Onsabruck. Münster is the capital. Population, 1915, 3,618,090.

WEST PITTSTON (pĭts'tŭn), a borough of Pennsylvania, in Luzerne County, on the Susquehanna River, opposite Pittston. It has electric railway facilities with Pittston and other points and contains many fine private and business buildings. The manufactures include machinery, cigars, and clothing. Many Pittston business men have their homes in the borough. Population, 1900, 5,846; in 1920, 6,968.

WEST POINT, a village of New York, in Cornwall township, Orange County, on the Hudson River, 52 miles north of New York City. It has regular communication by steamboats and by the West Shore and the New York Central railroads. The place occupies an attractive site on the west bank of the river, affording a fine view of the river and the adjacent hills, which tower from 475 to 1,500 feet above sea level. West Point is celebrated on account of being the seat of the United States Military Academy. At the time of the Revolution it was fortified under an act of Congress. This body authorized a corps of engineers and artillerists to permanently garrison the forts and in addition provided for the instruction of 32 students. In 1798 the corps was enlarged, and the number of instructors and cadets to be maintained was likewise extended. With the growth of the military importance of the United States there has been a constant enlargement of the institution, and the course of study has been extended from time to time to meet the demands of consecutive development.

The reservation occupied by the military post comprises 2,300 acres. Although the place was an important strategic point at the time of the Revolution, the government did not acquire title to the land until in 1790. Kosciusko, the Polish soldier, was retained as the engineer and the place was fortified under his direction. It was commanded by Benedict Arnold in 1780, who conspired to betray his trust to the British, but the scheme was averted by the arrest of Major André. Congress made the place the seat of the United States Military Academy in 1802. See **United States Military Academy.**

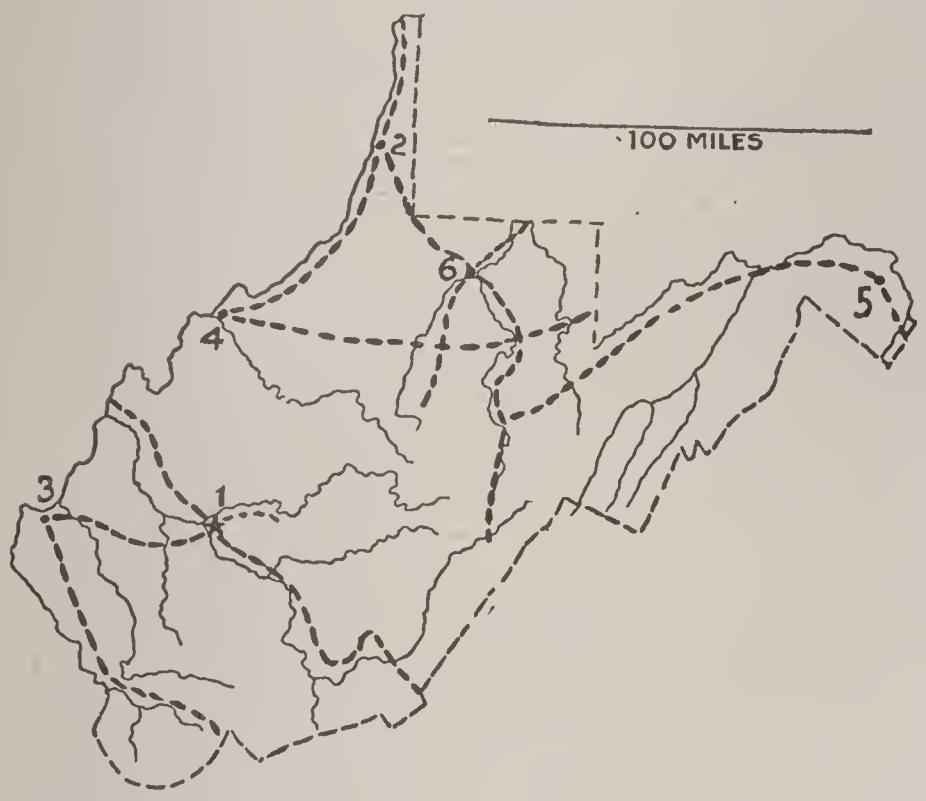
WEST SPRINGFIELD, a town of Massachusetts, in Hampden County, on the Boston and Albany Railway. It is situated on the Connecticut River, opposite Springfield, and is popular as a residential center. The chief buildings include the public library with 8,500 volumes, several fine public and secondary schools, and a number of churches. Among the manufactures are clothing, machinery, and hardware. It has extensive railway repair shops, waterworks, and electric lighting. The first settlement was made in the vicinity about 1655 and it was incorporated as a town in 1774. Population, 1905, 8,101; in 1920, 13,443.

WEST VIRGINIA (vẽr-jĭn'ĭ-ȧ), a Middle Atlantic State of the United States, popularly called the *Pan Handle State*. It was bounded on the north by Ohio, Pennsylvania, and Maryland; east by Pennsylvania, Maryland, and Virginia; south by Virginia and Kentucky; and west by Kentucky and Ohio. The boundaries are quite irregular, being formed on the southeast by the Allegheny Mountains, on the southwest by the Big Sandy River, on the northwest by the Ohio, and on the northeast by the Potomac. A narrow strip of land, called the *Pan Handle,* extends northward between Ohio and Pennsylvania. The greatest extent from southwest to northeast is 210 miles and the distance across the State from east to west is 125 miles. The area is 24,780 square miles.

DESCRIPTION. The general surface of the State

is hilly, while the eastern part is mountainous, where it is traversed by the Greenbrier Mountains and other ranges of the Appalachian system. These highlands occupy about one-third of the surface and in the southern part merge into the Cumberland Plateau. The mountains have the form of parallel ridges which trend from the northeast toward the southwest, but in the southern part merge into a generally hilly section. Spruce Knob, the highest point in the State, has an altitude of 4,860 feet. Along the Ohio River the altitude is about 550 feet and farther east, midway in the State, the general altitude is 2,000 feet.

The drainage of the larger part of the State belongs to the Ohio basin, but a small section in the northeast is tributary to the Potomac, which separates the State from Maryland. Several streams flow into the Potomac, including



WEST VIRGINIA.

1, Charleston; 2, Wheeling; 3, Huntington; 4, Parkersburg; 5, Martinsburg; 6, Fairmont. Principal railroads shown by dotted lines.

the South Branch, which is the largest headstream. The Big Sandy separates the State from Kentucky and has a course toward the northwest into the Ohio. Other streams that are tributary to the Ohio include the Monongahela, the Little Kanawha, the Great Kanawha, the Greenbrier, and the Guyandotte. The Ohio is important for navigation and many of the streams within the State furnish abundant water power.

The climate is quite equitable and has no great extremes of heat and cold. All parts of the State have an abundance of rainfall for the maturity of crops. In the northeast the rainfall is 22 inches and in the south it is about 45 inches. The extremes of temperature are 10° below zero in winter and a summer heat of 98°. Considerable snow falls in all parts of the State, but it does not lie long upon the ground in the south. Fine forests of walnut, oak, poplar, chestnut, butternut, ash, cherry, locust, and hemlock abound.

Mining. The mineral sources are both varied and extensive. In the output of coal it is exceeded only by Pennsylvania, and the yield per year is placed at 48,750,000 tons. A large share of the coal mined is anthracite, and the bituminous coal obtained is of a high quality. It has a large output of natural gas and petroleum, both of which are conveyed by pipe lines to considerable distances. These minerals are found in many sections, in fact the coal measures underlie a large part of the State, and many of the veins have a thickness of four to six feet. Clays and building stone are obtained in large quantities for manufacturing and construction purposes. Other minerals include salt, iron, bromine, copper, alum, and sulphur.

Agriculture. The average size of farms is 114 acres and fully three-fourths are worked by their owners. Farming is especially profitable in the western part of the State, where the soil is highly fertile, while the eastern section is well adapted to grazing. Corn is the leading cereal, but is followed closely by the interests vested in the growing of hay and wheat. Farming as a whole is conducted on a modern basis, and considerable commercial fertilizers and the rotation of crops are employed to maintain fertility. Oats, buckwheat, potatoes, rye, tobacco, sorghum cane, and dry beans are grown profitably. Fruits are produced in large quantities, especially apples, quinces, peaches, pears, grapes, plums, and small fruits. Large interests are vested in raising cattle for meat and dairying. Other domestic animals include horses, sheep, swine, mules, goats, and poultry.

Manufactures. The extensive fields of coal, petroleum, and natural gas give an immense impetus to the manufacturing enterprises, especially in the production of iron and steel, coke, and lumber products. Iron and steel rank as the most important products, and the enterprises concerned in commodities made of these metals are centered largely in the vicinity of Wheeling. Next of importance are the lumber and timber products. Other important manufactures include leather, flour and grist, railway cars, pottery, brick and tile, glass, and machinery. The State takes high rank in the production of butter and cheese, in the output of cigars and smoking tobacco, and in the canning of fruits and vegetables.

Transportation. The Ohio is the most important navigable highway, but steamboat facilities are provided by the Big Sandy and the Great Kanawha. Development in railroad building has brought most sections of the State in close touch with trade centers. The three trunk lines that cross the State are the Baltimore and Ohio, the Norfolk and Western, and the Chesapeake and Ohio. A total of 3,750 miles of railways are in operation. Considerable traffic is

carried by electric railway lines. Much has been done to provide suitable highways and maintain them by local authorities.

GOVERNMENT. Executive authority is vested in the governor, secretary of State, auditor, treasurer, attorney general, and superintendent of free schools, all elected for terms of four years. In case of vacancy in the office of Governor, the president of the senate and the speaker of the house are in the line of succession to that office. Legislative authority is exercised by the General Assembly, which consists of the senate of 24 members and the house of delegates of 65 members. Senators are elected for four years, while the delegates are elected for two years. Four judges elected for terms of twelve years constitute the superior court, the highest judicial tribunal. In addition there are circuit courts, courts of limited jurisdiction, courts of county commissioners, and justices of the peace. Local government is administered by the counties, towns, and municipalities.

EDUCATION. The State maintains separate schools for white and colored pupils. A part of the revenues is obtained from the income on a permanent school fund, but the larger portion is derived from a system of general taxation. Based upon the total population of ten years of age and upward, the illiteracy is 11.4 per cent., but it is much larger among the colored than among the white inhabitants. A commission was appointed in 1906 to revise the school laws. The commission reported in 1908, when many improvements were made in the system of common schools, as well as in the high school education, and many of the district schools were consolidated. The average length of the school term is about 140 days. Normal schools for the training of teachers are maintained at Athens, Fairmont, Glenville, Huntington, Shepherdstown, and West Liberty. Additional normal training is provided in the West Virginia Colored Institute, at Institute.

The University of West Virginia, at Morgantown, is at the head of public instruction. Other institutions of higher learning include the Bethany College, at Bethany; the Barboursville College, Barboursville; and the West Virginia College, Flemington. The State prison is at Moundsville, hospitals for the insane are located at Spencer and Weston, and an institution for the deaf, dumb, and blind is at Romley. Pruntytown has a reform school for boys and Salem has a reform school for girls. An asylum for incurables is maintained by the State at Huntington. The labor of the convicts is utilized in supporting the State penitentiary.

INHABITANTS. The State has a small proportion of foreign-born inhabitants, the total being only 23,451. Among the leading Christian denominations are the Methodists, Baptists, Roman Catholics, Presbyterians, Lutherans, and Disciples. Charleston, on the Great Kanawha, is the capital. Other cities include Wheeling, Huntington, Parkersburg, Martinsburg, Fairmont, Grafton, Moundsville, and Clarksburg. In 1900 the State had a population of 958,800. This number included 43,567 colored people, of whom 43,499 were Negroes. Population, 1920, 1,463,610.

HISTORY. West Virginia was a part of Virginia until the latter State passed the ordinance of secession on April 17, 1861. Shortly after the people of the western and northwestern part of Virginia called a convention at Wheeling, at which it was decided that the officers of the State who were opposed to the national government should not be recognized, and a State Legislature was called to meet at Wheeling. The new State thus formed was called *Kanawha,* and obtained permission to separate from Virginia by the Virginia Legislature. Congress admitted the State as West Virginia on June 19, 1863. Many volunteers from West Virginia served in the Civil War. It was the scene of John Brown's raid at Harper's Ferry and the battles at Philippi, Cheat Mountain, Beverly, and Carnifex Ferry. Since the war it has made rapid strides in the development of its natural resources and is constantly gaining in population and wealth.

WEST VIRGINIA, University of, a coeducational institution of higher learning at Morgantown, W. Va., established in 1868. It was founded as a State university, being the successor of the West Virginia Agricultural College, the Woodburn Seminary, and the Monongahela Academy. The courses include arts and sciences, law, agriculture, commerce, music, engineering and mechanical arts, and military science and tactics. With it are affiliated preparatory schools located at Geyser, Morgantown, and Montgomery. The institution has a faculty of 120 instructors and professors and is attended by 2,150 students. The library contains 60,000 volumes and the value of the property is placed at $950,000.

WETTERHORN (vĕt'tĕr-hôrn), an elevated mountain peak of Switzerland, in the Grindelwald, ten miles southeast of Lake Brienz. Limestone constitutes the chief geological formation. In many places the slopes are nearly perpendicular for hundreds of feet. The mountain rises in three peaks, their respective heights being 12,125, 12,175, and 13,280 feet.

WEYLER (wā'lĕr), **Nicolau Valeriano,** soldier, born at Palma, in the island of Majorca, Dec. 17, 1838. He first entered the military service as a Carlist and afterward invaded Africa against the Moors, where he secured an unenviable reputation for practicing acts of barbarity in subduing the natives. Subsequently he was made captain general of Catalonia, in Spain, and later governor general of Cuba. He reached Havana on Feb. 10, 1896, where he was given an enthusiastic reception, and a week later issued three proclamations establishing severe martial law. In 1898 he was superseded by General Blanco as commander of the Spanish forces

in Cuba, his recall being deemed essential in the interests of peace in Spanish-America. He made a trip through America on his way back to Europe, where he subsequently exercised much influence as a member in the cabinet of Sagasta.

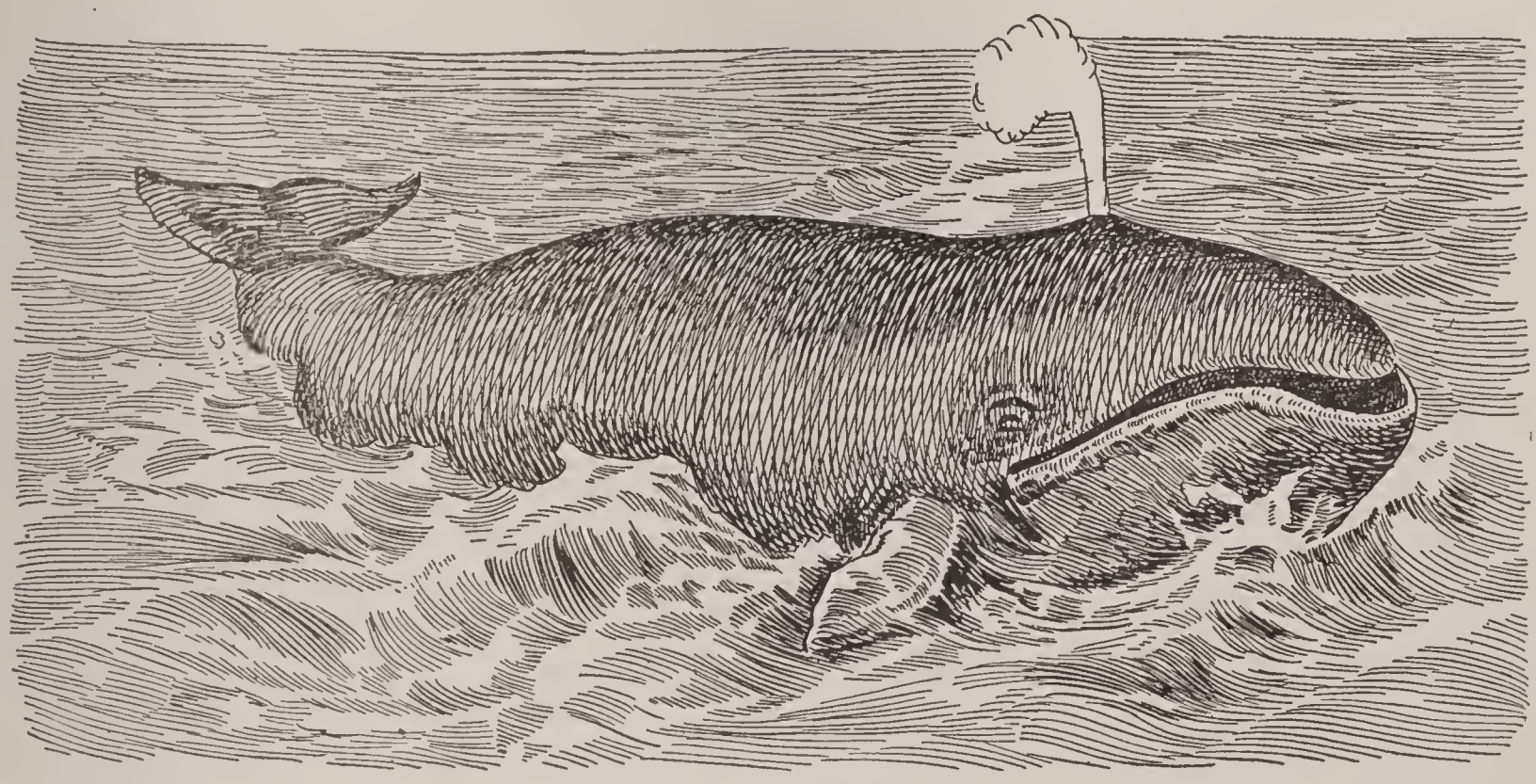


NICOLAU V. WEYLER.

WEYMAN (wī′mạn), **Stanley John,** novelist, born in Ludlow, England, Aug. 7, 1855. After graduating from Oxford University, he became classical instructor, in 1878, at the King's School, Chester. In 1881 he was admitted to the bar and entered the practice of law, but gave considerable attention to literature. His first writings appeared in the *Cornhill Magazine,* in 1883. Soon after he went on an extended tour, visiting various parts of Europe. His chief literary works include "Story of Francis Cludde," "The Man in Black," "My Lady Rotha," "The House of the Wolf," and "Memoirs of a Minister of France." A number of his writings have been translated into French, German, and other continental languages.

WEYMOUTH (wā′mŭth), a town of Massachusetts, in Norfolk County, twelve miles southeast of Boston, on the New York, New Haven and Hartford Railroad. It has electric street railways, public waterworks, and sanitary sewerage. Among the features are the high school, the townhall, many fine churches, and the Tufts library. The manufactures embrace nails, isinglass, boots and shoes, fireworks, hardware, and machinery. It has a large trade in coal and lumber. The place was settled in 1623, when it was called Wessagusset, but was incorporated under the present name in 1635. Population, 1905, 11,585; in 1920, 15,057.

WHALE, the common name of animals belonging to the order *Cetacea,* with which are included the porpoise and the dolphin. They are formed somewhat like fishes and like them live in the sea, but they are really mammals; that is, they are warm-blooded, breathe air by means of lungs, and their young are born after a long pregnancy in a well developed condition. The head constitutes about one-third of the body, the mouth is large, the lips are stiff and immovable, and the tail is flattened horizontally instead of vertically as in fishes. They have no external ear and the eyes are small and far back from the wide mouth. The posterior fins are absent, but the anterior fins are well developed, and under the skin of the latter are all the joints found in the human hand and arm. The anterior fins serve to balance the animal in the water, while the projectile movement is effected by the tail. Whales have two large nostrils on top of the head for breathing,



BALEEN WHALE.

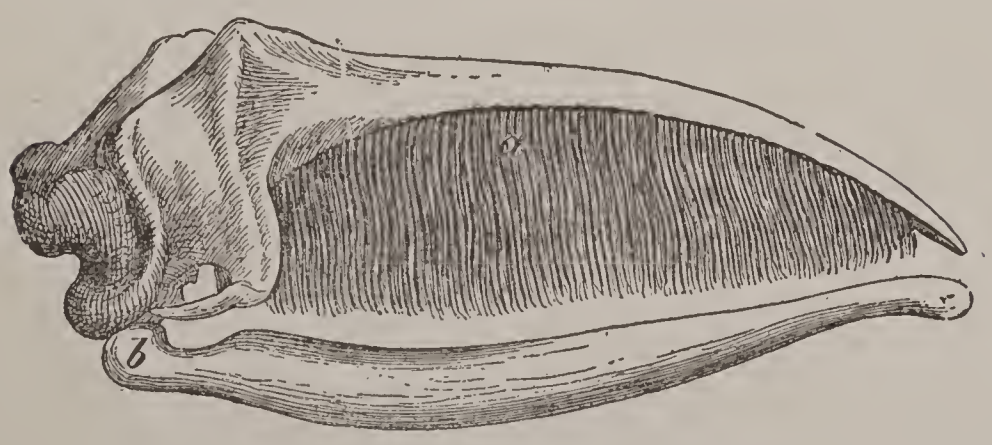
and come to the surface about every twenty minutes to blow out water and take in air. Under the skin is a fatty substance called *blubber,* which in some whales is two feet thick. As it is lighter than water, it serves in enabling the whale to swim, and aids in keeping the blood warm in the cold, Arctic seas. This blubber yields a fine oil, but the whale is also hunted for its spermaceti, a white, oily substance contained in the head of the sperm whale, for whalebone, and for ambergris.

Two distinct families of whales are recognized—the *baleen,* or *whalebone, whale* and the *sperm whale,* or *cachalot.* The whalebone whale family includes the *Greenland whale,* or *right whale,* and the *rorqual.* These species have no teeth, but instead have plates of whale bone in

the mouth, and from them are suspended a kind of fringe, which serves to aid them in separating their food from the water. The Greenland whales commonly grow to a length of from 50 to 70 feet, while the rorqual whales attain a length of 170 to 200 feet, and are thought to be the largest species of living animals. Both of these species yield whalebone, a well-known horny substance derived from the thin, parallel plates in the upper part of the mouth. It is used for stiffening stays and for ribs in parasols and umbrellas. A young whale is usually eight to twelve feet long at birth and is suckled by the mother for nearly a year.

Sperm whales are about as large as the Greenland whale, but differ from them in having teeth in the lower jaw and in yielding spermaceti and ambergris. The former is used in making candles and the latter for perfumery. Whale fisheries are not as important as formerly, but valuable catches are still obtained in the Bering Sea, off Greenland, and in the vicinity of Spitzbergen. Whale fishing is carried on by means of boats, from which harpoons are cast into the whales, and they are afterward slain with a lance. Harpoons are iron weapons, about three feet long, and to them a line is attached. When a whale is seen, the harpoon is thrown into its body by the harpooner, or by means of a harpoon gun. The whale dives out of sight as soon as it is struck by the harpoon, but comes up again in fifteen or twenty minutes to breathe, when a second harpoon is cast. At length it is overpowered and killed with the lance, a spear of iron about six feet long. It is then cut up and the oil is extracted from the blubber and the whalebone is dried. Petroleum has largely displaced candles made of whale oil, but it is still used largely for food and lighting in cold countries, especially by the Eskimos.

WHALEBONE, or **Baleen**, the horny plates or blades found in the mouth of the right whale. These plates number about 300 in the mouth of a full-grown animal, are from a few inches to twelve feet in length, and serve the purpose



SKULL OF THE BALEEN WHALE.
a, Baleen, or bony plates; *b*, Lower Jaw-bone.

of retaining the food. It is not properly bone, but bears some resemblance to the horns of cattle and the hoofs of the mule and horse. In structure it is almost identical with the horns of the rhinoceros. Whalebone is used in making whip handles, stays in clothing, ribs of parasols and umbrellas, and in the manufacture of canes and upholstery. The decline of the whale fisheries has caused the price of whalebone to rise, hence it is replaced to some extent by steel and vulcanite.

WHANGHO. See **Hoang-ho.**

WHARF, a structure of wood or stone on the bank or margin of navigable waters, constructed so as to provide a suitable platform for the loading and unloading of vessels. They are built either as quays or piers, depending upon the depth of the water and the nature of the shore line. Quays are wharves that are built parallel with the shore, while piers extend into the water at right angles to the line of the shore. Wharves maintained on the margin of streams and where the tide has a material effect are usually in the form of quays, while those used in lakes and rivers are frequently constructed as piers. In most cases piles are driven into the bottom of the harbor and the framework is covered with heavy planking. In most countries the wharves are controlled by the national government and owners of ships are charged a nominal rental when their vessels make use of them. However, in the United States the privileges are controlled by the several states, which lease them to individuals or corporations, and in this way they are managed as an enterprise for the profit obtained from leases.

WHARTON (hwôr'tŭn), **Edith**, novelist, born in New York City, in 1862. She was educated by private tutors in her home and in 1885 married George Wharton, of Boston. Her writings have been widely read, both in America and Europe. She translated from the German Sudermann's "The Life That Is Lived." Her leading works include "The Greater Inclination," "Italian Villas and Their Gardens," "Crucial Instances," "The Touchstone," "The Valley of Decision," and "The House of Mirth."

WHARTON, Francis, jurist, born in Philadelphia, Pa., March 7, 1820; died Feb. 21, 1889. He graduated from Yale University in 1839, studied law, and began a successful practice in Philadelphia. In 1845 he became assistant attorney-general and in 1856 was made professor of logic and rhetoric at Kenton, Ohio, where he labored successfully for several years. In the meantime he made a tour of Europe, was ordained to the pastorate of the Episcopal Church, and for some time served as rector in Brookline, Mass. In 1885 he was appointed by President Cleveland as counsel of the State Department in Washington, D. C., and subsequently became editor of the *Revolutionary Diplomatic Correspondence* of the Federal government. His books include "A Treaty on Theism and Modern Skeptical Theories," "The Silence of Scripture," "A Treatise on the Law of Homi-



THRESHING BY ELECTRICITY, NEAR BRANDON

In the fall of the year the prairies are stripped of their ripened grain and the gathered wealth is threshed by some one of the many wonderful devices offered by modern mechanical science. As a general thing steam is the motive power used in threshing, but other forces also are called into play, and among them that of electricity has been evoked to work the fans and screens that prepare the grain for market.



WHEAT FIELDS NEAR VIRDEN

The magnitude of the wheat fields of Manitoba is a feature that excites the astonishment of the Old World tourist and the admiration of the New World farmer. It is easy to find points where the level prairie as far as the eye can see is a billowy ocean of waving grain in the growing season, and a vast stretch of sheaf-dotted plain in the harvest time. Virden, situated a little west of Brandon, lies in a typical farming area.

(Art. Wheat)

cide in the United States," and "A Treatise on the Criminal Law of the United States."

WHATELY (hwāt'lĭ), **Richard,** clergyman and author, born in London, England, Feb. 1, 1787; died in Dublin, Oct. 8, 1863. His father was a clergyman at Bristol, where he attended a private school, and afterward graduated from Oxford University. In 1811 he was elected fellow of Oriel College, but three years later became a clergyman. He did vigorous work in a parish for two years, but in 1825 was made principal of Saint Albans Hall, where he greatly improved the instruction and increased the classes, and subsequently became a lecturer on economics. In 1831 he was appointed Archbishop of Dublin, in which capacity he did much for the mission and school work in Ireland and rendered services by extending large charities to the people, especially during the famine. He was not only a tireless worker in the church and school, but was a writer on religious, historical, and philosophical topics. Among his best known works are "Historic Doubts Relative to Napoleon Bonaparte," "Use and Abuse of Party Spirit in Matters of Religion," "Christian Evidences," "Elements of Logic," "Scriptural Revelations Concerning a Future State," "Lectures on the Parables," and "Lectures on the Study of Saint Paul's Epistles."

WHEAT, an important and largely cultivated cereal. It is excelled by rice alone with reference to the number of people using it as



HEADS OF WHEAT.

a staple food. The plant that produces this grain is a tall, slender annual or biennial, having a hollow, jointed stem and bearing at its summit a somewhat four-cornered spike of usually four-flowered spikelets, called the *ear,* or *head.* Though not known in a wild state, it is thought to have come from Asia. It has been cultivated so long that many species have been developed, all more or less valuable as a food product and adapted to different soils and climates.

Although wheat flourishes in regions considerably different from each other and is cultivated in many parts of the earth, it thrives best in a temperate climate and in rich clay and loam soils. The chief species include bearded wheat, unbearded wheat, and spelt or German wheat. *Bearded wheat* has a kind of awn or slender spine extending from the ears, while *unbearded wheat* is awnless. *Spelt* is less valuable than other species, but it possesses the advantage of growing in poorer soils and at greater elevations. Wheat is distinguished also as spring and winter, or fall, wheat. *Spring wheat* is sown in the spring and harvested in July or August, while *winter wheat* is sown in autumn and is harvested the following summer. While both kinds are of high value, winter wheat usually commands a slightly higher price in the market, owing to its yielding a larger per cent. of flour. Two other classes of wheat are the *red wheat* and *white wheat,* these names being applied on account of the color of the grain. The white wheat is less hardy than the red, but it yields better and is of a finer quality.

Few plants have a higher value than wheat. As a food product it possesses much utility, owing to its containing a large per cent. of starch and gluten. It likewise has mineral properties of value in supporting the body. The grains are removed from the husks by a threshing machine and are afterward ground into flour. Besides the use of wheat flour in making bread, it is employed extensively in the production of starch, crackers, and macaroni. The bran, shorts, and husks are of value as food for animals, and the straw is employed for animal food and in the manufacture of various articles, such as straw hats and mats. The total production of wheat in the world is estimated at 2,675,000,000 bushels, of which Europe produces about one-half. At present the United States is the greatest wheat-producing country in the world, the annual production being 850,500,000 bushels. Minnesota and North Dakota have long ranked as the leading wheat-producing states, the annual yield of the former being about 95,000,000 bushels, and of the latter, 72,500,000 bushels. As a whole, the most productive wheat-growing region is in the northwestern states. The states ranking next to Minnesota and North Dakota in growing wheat include Kansas, South Dakota, Nebraska, Ohio, Indiana, Michigan, California, Texas, Iowa, Oregon, Washington, and Pennsylvania. Canada produces annually about 325,000,000 bushels, the largest crops being grown in Manitoba, Ontario, Saskatchewan, and Alberta. Russia, France, India, Austria, Australia, Germany, Spain, and Italy are leading wheat-producing countries. Chicago, Minneapolis, Duluth, Buffalo, Winni-

peg, and Vancouver are among the leading wheat markets of North America.

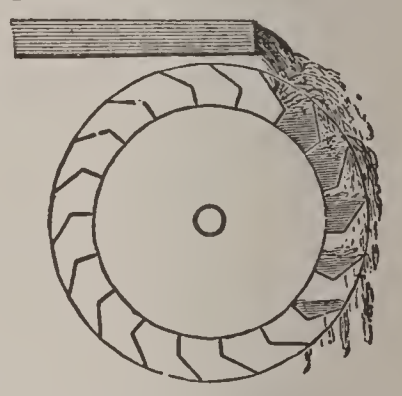
WHEAT MIDGE, an insect which is harmful to wheat, related more or less closely to the Hessian fly. It is native to Europe, but was brought to the Province of Quebec, Canada, at an early date, whence it has spread to the region extending through the central part of North America. The adult is of an orange or yellow color, but does not make its appearance until in early summer. It is about one-tenth of an inch long and lays small eggs in the heads of wheat as the grain stands in the field, and when the larvae appear they extract the milky juice and cause the heads to blight. The larvae, after attaining full growth, descend to the ground and hibernate in small cocoons. Deep plowing causes them to be destroyed in large numbers.

WHEATON (hwē'tŭn), **Loyd,** soldier, born at Fairfield, Mich., July 15, 1838. He joined the Federal army as first sergeant at the beginning of the Civil War, became captain in 1862, major in 1863, and lieutenant colonel in the volunteer service in 1864. In 1866 he was made captain in the regular army and in 1891 became major. He aided in suppressing a Fenian raid from United States territory upon Manitoba in 1871, and in 1874 took part in Custer's expedition to the Black Hills. During the Spanish-American War he was brigadier general and commanded a division of the seventh army corps in Cuba. In 1899 he was sent to the Philippines to aid in suppressing the insurrection in Luzón. He was retired from the service in 1902. He died Sept. 17, 1918.

WHEATON, Henry, author and diplomat, born in Providence, R. I., Nov. 27, 1785; died March 11, 1848. He studied at Brown University, where he graduated in 1802, and three years later was admitted to the bar. Subsequently he studied in Europe, but returned to the United States in 1807 to begin the practice of law at Providence. In 1812 he removed to New York and for some time edited the *National Advocate,* which became an influential organ in politics. He was made reporter of the United States Supreme Court in 1816, serving until 1827, and for some time was *chargé d' affaires* in Denmark, where he displayed great diplomatic skill. From 1837 to 1846 he was minister plenipotentiary at the court of Prussia. His "Elements of International Law," which has been translated into several languages, is his best known publication. Other writings include "A History of the Northmen," "Digest of the Decisions of the Supreme Court of the United States," "A Digest of the Law of Maritime Captures and Prizes," and "A History of the Law of Nations in Europe and America."

WHEATSTONE (hwēt'stŭn), **Sir Charles,** electrician and inventor, born in Gloucester, England, in 1802; died in Paris, France, Oct. 19, 1875. He was the son of a music seller and became a musical instrument maker. Besides making a number of discoveries in acoustics, he extended his investigations to light and electricity, and in 1834 became professor of King's College, London. In 1837 he obtained a patent for a kind of telegraph, but it was not adapted to practical use until after Morse patented his telegraphic instrument. Other inventions include an electric alarm, an improved stereoscope, and several electrical appliances. In 1838 he became a member of the Royal Society and in 1868 was knighted by Queen Victoria. He contributed largely to science by writing a number of valuable papers, among them "New Experiments in Sound," "Acoustic Figures," and "Experiments to Measure the Velocity of Electricity." He contributed largely to the *Philosophical Magazine* and the *Journal of the Royal Institution.*

WHEEL, a circular frame or solid disk employed to reduce friction and facilitate movement, as in vehicles; to produce rotary motion, as in machines; or to modify speed, as in the form of pulleys. Many kinds of wheels are employed in the arts and industries, the form and structure depending on their uses. The only feature which is universally characteristic in wheels is rotation, which may be either partial or entire. When the wheel is of elliptical form, it is called a *cam,* and when the edges are toothed, it is termed a *gear.* The center piece is designated a *shaft,* or *arbor,* when the wheel turns with it, and an *axle* when the wheel turns on it. Wheels for vehicles are commonly made of wood, with a wooden hub strengthened by bands, inside of which is a metallic box or bushing for the axle skein, the spokes being mortised into the hub and tenoned into the rim or felly, the whole being strengthened by a metallic tire. Other vehicle wheels have a light rim connected with the hub by wire spokes, as in modern bicycles and some other vehicles, or they are of iron or steel, either cast in one piece or with a metallic hub connected by plates with a rim.

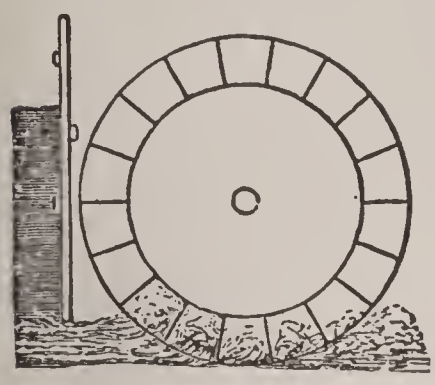


OVERSHOT WHEEL.

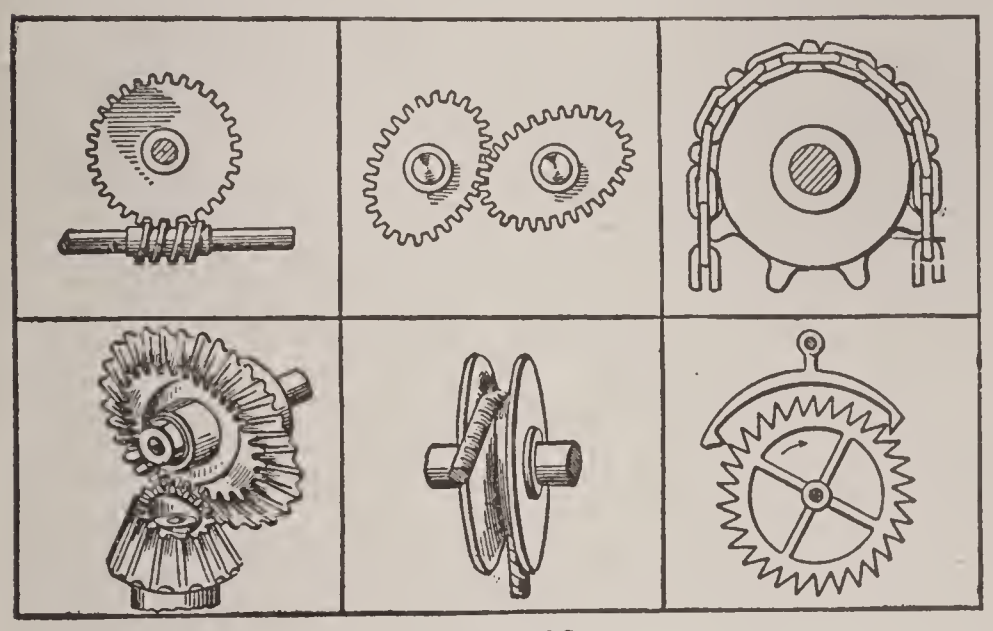
Within recent years rubber tires have been placed on many carriages and light vehicles, though these are generally attached to a main tire of metal, while pneumatic tires have come into general use on bicycles. Car wheels are usually solid and are made either of iron or steel, of iron and steel, or of paper, iron, and steel. Street car wheels are made of similar material, but in most cases they are lightened by having cast spokes. The wheels used in machinery are known as *cog, belt, spur, crown, fly, ratchet, pinion,* or *balance* wheels. Sets of wheels in machinery are joined by belts or

bands, or transmit motion by means of teeth or cogs.

The development of the power of water through *water wheels* is about five centuries old. No exact date can be given for the first device of this kind, the earliest authentic record being a description of the water wheels at Lyons, France, dated in 1555. There are three ways in which the energy or motion of a running stream can be transferred to a water wheel, namely, by impact, by weight, and by the reaction of the escaping jet. An *undershot wheel* is driven by impact, the wheel being moved mainly by the impact or blow produced by the moving water striking the flat boards of the wheel. An *overshot wheel* has buckets or boxes on the rim and the water, which flows into the buckets from above, turns the wheel by its momentum and by the weight of the water in the buckets, the side of the wheel that receives the water being heavier than the opposite side. The reaction of the escaping jet is utilized in the *turbine water wheel,* which is driven partly by the momentum of the moving water and partly by the weight of the water in the buckets. Many forms of turbines are in use, the axis of rotation being either vertical or horizontal. The size of all classes of water wheels varies with the water supply and the power which is desired. See **Turbine.**



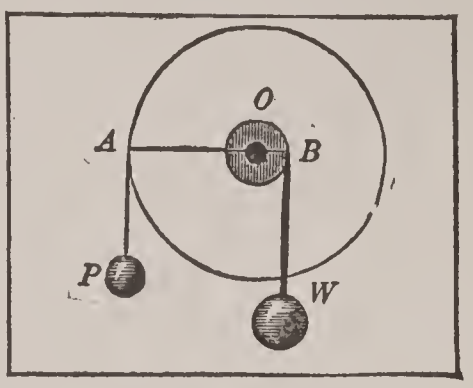
UNDERSHOT WHEEL.



WHEELS.

Screw Gears. Bevel Gears. Elliptical Gears. Pulley. Sprocket Wheel. Escapement.

WHEEL AND AXLE, a machine in the form of a continuous lever, in which force is applied at the circumference of a wheel to raise a weight attached to a rope wound around the axle. A windlass is a form of wheel and axle. When the crank of a windlass is turned, the rope is wound around the axle, which causes the weight at the lower end of the rope to be raised. The wheel and axle is a modification of the lever, the fulcrum is at the axis, the arm of the force is the radius of the wheel, and the arm of the weight is the radius of the axle. One complete turn of the wheel causes the weight to be raised only the length of the rope wound once around the axle, hence a force of a pound weight applied at the axle causes a weight to be raised as many more pounds, hung to the axle, as the circumference of the wheel is greater than the axle. When a winch is substituted for the wheel, the circumference described by the power in one revolution is substituted for the circumference of the wheel. The capstan is an example of this mechanical power. It is used extensively in moving houses and bodies of large bulk, while the windlass is used for raising water from a well.



WHEEL AND AXLE.

A, circumference of the wheel; *O,* circumference of the axle; *P,* power; *W,* weight; *B,* radius of the axle.

WHEELER (whēl′ẽr), **Benjamin Ide,** educator, born at Randolph, Mass., July 15, 1854. He graduated at Brown University in 1875 and subsequently studied at Heidelberg, Germany. On returning to America, he taught in Brown, Harvard, and Cornell universities and in 1899 became president of the University of California. He was honored by official positions in numerous state and national educational and scientific associations. Among his publications are "The Greek Noun-Accent," "Introduction to the History of Language," "Life of Alexander the Great," "Dionysios and Immortality," "Analogy in Language," and "Organization of Higher Education in the United States."

WHEELER, Joseph, soldier and statesman, born in Augusta, Ga., Sept. 10, 1836; died Jan. 25, 1906. In 1859 he graduated from the West Point Military Academy and soon after became lieutenant of cavalry in New Mexico. He resigned from the Union service in 1861 to enter the Confederate army as lieutenant of artillery. His efficient services caused him to be promoted successively. He was made commander of an army corps and in 1862 was as-



JOSEPH WHEELER.

signed to a command of cavalry in the West, where he continued until the war closed. He received the thanks of the Confederate Congress and of the South Carolina Legislature for successful military operations. In 1866 he was appointed professor of philosophy in the Louisiana State Seminary, but declined in order to enter the law practice at Wheeler, Ala. He was elected to Congress from Alabama as a Democrat in 1880 and was reëlected in 1884, in 1888, and in 1894. In 1898 he was made major general of volunteers in command of dismounted cavalry in the Santiago campaign of the Spanish-American War, and subsequently served as brigadier general in the Philippines, retiring with that rank in 1900. He published "The Santiago Campaign."

WHEELER, William Almon, statesman, born in Malone, N. Y., June 30, 1819; died there June 14, 1887. After securing his education and being admitted to the bar, he entered upon a successful law practice and was United States district attorney in New York from 1845 to 1849. He served in the New York State senate from 1858 to 1859, was elected to Congress as a Republican in 1860, and was reëlected consecutively, serving until 1877. In 1874 he wrote the famous compromise measure which quieted political disturbances in Louisiana, and two years later was the successful Republican nominee for Vice President. He served in that office during the Presidency of Hayes and became remarkably popular on account of great liberality and eminent ability. In 1881 he retired from public life and remained a resident of Malone until his death.

WHEELING (hwēl'ĭng), a city of West Virginia, in Ohio County, seventy miles southwest of Pittsburg, Pa., on the Baltimore and Ohio, the Pennsylvania, the Wheeling and Lake Erie, the Pittsburg, Cincinnati, Chicago and Saint Louis, and other railroads. It is conveniently situated on the Ohio River, in the Pan Handle district of the State, and has communication by a number of electric railways. The city is well built, containing an excellent courthouse, city hall, United States customhouse and post office, and numerous school buildings and churches. Other features include the Krugar Monument, the public library, the Haskin Hospital, the Linsley Institute, the Saint Joseph's Academy, the Wheeling Female Academy, and the Mount de Chantal Academy. Extensive deposits of coal and natural gas are in the vicinity. Among the chief manufactures are paper, nails, glass, leather, hardware, pottery, steam engines, boilers, cotton and woolen goods, and farming implements.

Wheeling is well provided with modern utilities. It has extensive systems of waterworks and sanitary sewerage. The streets are paved substantially and are lighted by gas and electricity. A part of the city is situated on Zane's Island, a tract of 400 acres in the Ohio River, which is reached by a suspension bridge which is 1,012 feet long. Wheeling was first settled in 1770. Fort Henry, named in honor of Patrick Henry, was built here in 1774. For many years it was an outpost of defense against the Indians. It became the capital of West Virginia when that State was admitted, in 1863, and remained the seat of government until 1870, when Charleston was made the capital. It was the capital from 1875 until 1885, when Charleston became the permanent capital. Population, 1900, 38,878; in 1920, 56,208.

WHIG, the name applied in England to the opponents of James II. Afterward the name was assumed in North America by the supporters of the cause of the colonies against the King of England in the Revolution. The Whigs disappeared from politics after the Revolution had been successfully accomplished and the people became divided into Federalists and Democrats. A division of sentiment came about in the administration of Andrew Jackson, when numerous small parties began to form, and in 1834 James Watson Webb led the opposition against the party of Jackson in forming the new Whig party, the name being assumed because the new party, like the Whigs of the American Revolution, declared itself against executive usurpations. It favored everything opposed by Jackson, namely, a national bank, a high protective tariff, the passage of bills over the veto by a majority vote, limitation of the power of removal from office, and extensive internal improvements.

William H. Harrison was the Whig candidate for President in 1836, but was defeated by Van Buren. He was again nominated in 1840 and defeated Van Buren, receiving 234 electoral votes, while the latter received 60. The party had a good working majority in each house of Congress, but Harrison died shortly after being installed in office, when Tyler became President. The latter showed strong democratic tendencies by vetoing two bank bills and two tariff bills and distributing the proceeds of land sales to the states. He was accordingly declared to be out of the party and Henry Clay became the candidate for President in 1844, but was defeated by James K. Polk. In 1848 Zachary Taylor, the hero of the Mexican War, was nominated and elected President, but he died in office and was succeeded by his Vice President, Millard Fillmore. The party became weakened by accepting the Compromise of 1850, which divided it into *Conscience Whigs* and *Cotton Whigs,* and in the election of 1852 the candidate, Winfield Scott, met with defeat. Many Whigs soon after joined the American party in the North, while the Southern Whigs generally united with the Democrats. A number of other parties, such as the Free Soilers, Constitutional Unionists, and Abolitionists, were strengthened, and from these elements the present Republican party was formed.

WHIPPLE (hwĭp′p'l), **Abraham,** naval officer, born in Providence, R. I., Sept. 16, 1733; died in Marietta, Ohio, May 29, 1819. He entered the navy at an early age and from 1759 to 1760 commanded the privateer *Gamecock* in the French and Indian War. In 1772 he headed the expedition which burned the *Gaspe* in Narragansett Bay, and at the beginning of the Revolutionary War was placed in command of two Rhode Island vessels. He commanded the *Providence* in 1776, which captured more British vessels than any other American ship. In 1780 he was taken a prisoner near Charleston, but was soon after released and in 1784 visited London. After resigning from the naval service, he joined the Ohio Company and settled at Marietta, where he resided until his death.

WHIPPLE, Henry Bennington, bishop, born at Adams, N. Y., Feb. 15, 1822; died Sept. 16, 1901. He gave up his college course because of ill health and engaged in a business career. Later he studied theology privately and was granted holy orders in 1850. Soon after he became rector at Rome, N. Y., but removed to Chicago in 1857. Two years later he was consecrated bishop of the Protestant Episcopal Church for Minnesota. He organized the Bishop Seabury Mission at Faribault, out of which have grown the Seabury Divinity School and the Cathedral of our Merciful Savior. Several successful missions were planted by him among the Indians. He is distinguished as an advocate of free churches. His writings include "Lights and Shadows of a Long Episcopate."

WHIP-POOR-WILL, a bird native to North America, which was so named from its cry, resembling the words *whip poor Will.* It is closely allied to the goatsucker of Europe. The length is about ten inches, with an alar extent of about twenty inches. The plumage is tawny-



WHIP-POOR-WILL.

brown and is much mottled with white and gray spots. A number of species have been described, all of which fly about in the evening in search of food. They skim along near the ground without making a noise, thus enabling them to catch the insects on which they feed. These birds retire into the woods during the day. Their familiar cry is heard mostly in the evening. They breed about the middle of May, incubating their eggs in rude nests on or near the ground.

WHIRLPOOL (hwĕrl′pōōl), an eddy or vortex in a river or in the sea, which is caused by the water flowing against a peculiarly formed bank, by the meeting of two currents, or by the action of winds upon currents and tides. Small whirlpools may be seen on nearly every stream, but they assume gigantic size in many places of the ocean and oceanic channels, where their motion attracts and engulfs floating objects. The most famous whirlpool in history is that of Charybdis, near Sicily, and another of considerable interest is the Maelstrom, in the Lofoden Islands, northwest of Norway. However, these and other famous whirlpools frequently mentioned have been greatly exaggerated, and the dangers attending them have been much overdrawn to lend enchantment to the tales connected with them.

WHIRLWIND, a local wind in which a body of air moves in a circular or spiral course, the movement nearly approaching the horizontal of the place where it may be situated. The movement of such a wind is about an axis and the plane or direction in which the whirling motion takes place may cause the axis to vary between the nearly horizontal up to a true vertical. Two currents of air which move in different directions cause a whirlwind, which may vary in size from a small eddy to a hurricane a thousand miles in diameter. Usually the cause may be assigned to a portion of the surface of the earth becoming highly heated, when the currents of air moving upward are replaced by a rush of air from all sides to take their place.



DUST WHIRLWIND IN ARABIA.

An observer may see the entire whirl, if it is of small size and passes over dusty ground, but large whirls are only seen in part and appear as straight-lined winds. Whirlwinds seldom occur on hilly ground and never take place when a strong wind is blowing. All whirls of considerable size are given a uniform direction by the rotation of the earth, from left to right in

the Southern Hemisphere and from right to left in the Northern. See **Storms.**

WHISKY (hwĭs'kĭ), an alcoholic spirit obtained by the distillation of a fermented starchy compound. The name is of Celtic origin and was derived from the word *uisgebeatha,* which means water of life. Although it was employed originally as a medicine, it soon became a beverage, and its use rapidly spread to the European continent. It was first made by distilling malted brandy, but is now derived also from wheat, corn, molasses, rye, rice, potatoes, and many other vegetable products containing starch. Whisky is generally classified as *grain whisky* and *malt whisky.* The former is considered the more inferior and is derived from unmalted grain, as corn, oats, barley, wheat, etc., and from rice, sugar, molasses, and potatoes. The best grade of malt whisky is made from barley, but good grades are obtained by malting wheat and rye. The product is usually named from the kind of grain which is employed in its manufacture, as *corn whisky, rye whisky,* and *wheat whisky.* The grains impart to it a characteristic flavor, but it is modified somewhat by the ferment used.

Whisky is used largely in making alcohol, gin, and brandy, but more commonly as a beverage. Many doctors prescribe it as a stimulating medicine, and, like alcohol, it enters largely into the preservative arts. It is almost colorless when first distilled, but assumes a reddish hue from the barrel into which it is drawn, but some grades are colored artificially. The United States formerly made the largest quantity of whisky and the heavy tax upon it was an important source of revenue to the government, reaching $80,750,000 annually. A bushel of grain yields about three and a half gallons of whisky and the manufacturer must pay a tax on that amount for every bushel of grain mashed. See **Alcohol.**

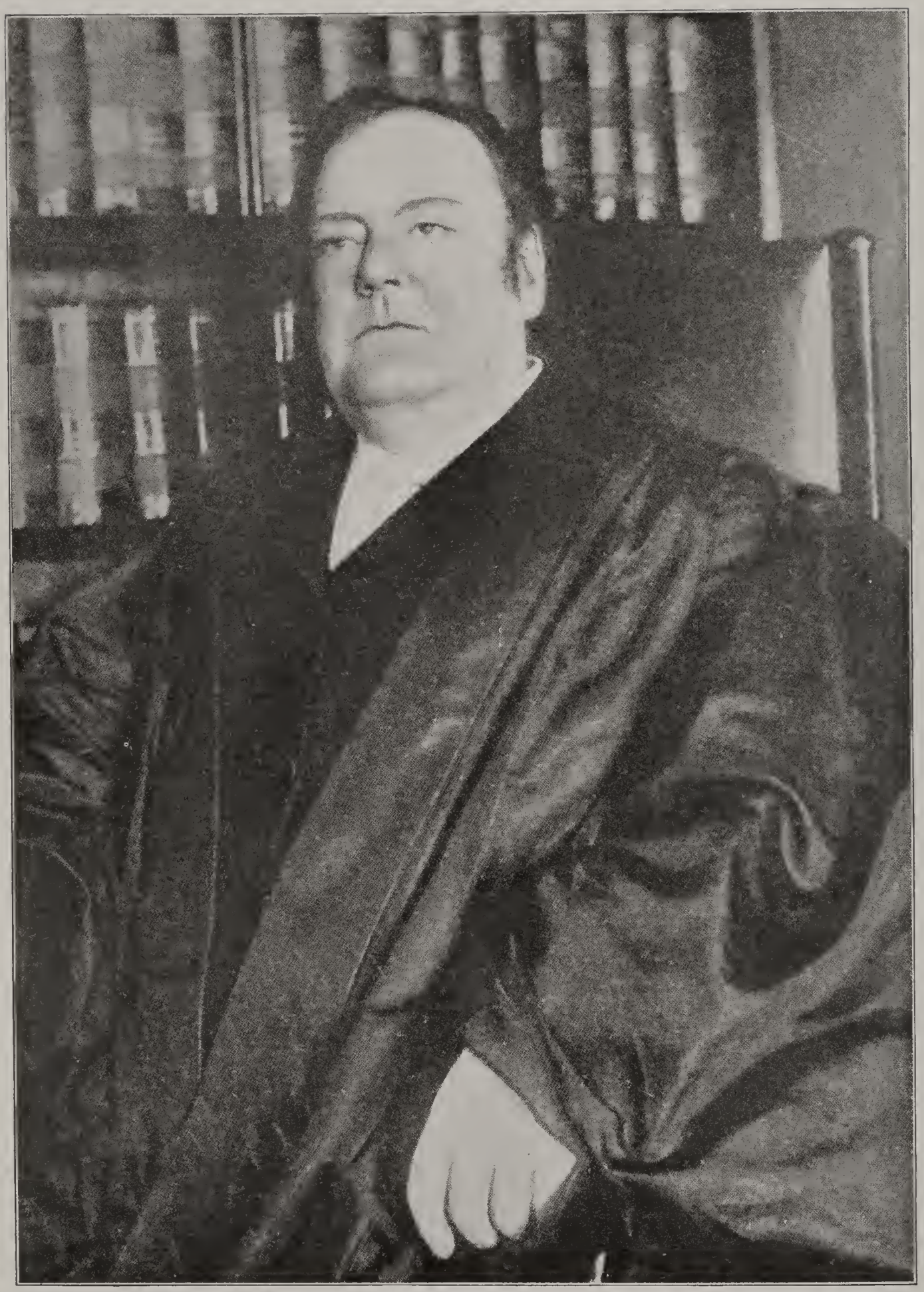
WHISKY INSURRECTION, a revolt in the United States, due to the enactment of a Federal excise law. It took place in the western part of Pennsylvania, in 1794, when the authorities undertook to enforce the collection of taxes upon whisky. Congress passed this law in 1791 as a means of raising revenue and considerable opposition formed against it in Virginia, North Carolina, and Pennsylvania, where a large number of the people were engaged in distillation and whisky was used as a medium of exchange. The masses held insurrectionary meetings and a number of the revenue officers were tarred and feathered. President Washington sent a force of 15,000 men to quiet the revolt in October, 1794, when the disturbances were suppressed. Several of the leaders were arrested and founded guilty of treason, but President Washington pardoned them. The affair had a good influence upon the nation, since it showed that the Federal government was determined to exercise its authority.

WHISKY RING, the name applied to a combination of distillers and revenue officers at Saint Louis in 1872, for the purpose of defrauding the government of the internal revenue tax on distilled liquors. It spread to many parts of the country, with branches at Cincinnati, Chicago, Peoria, Milwaukee, and New Orleans, and even had agents in Washington to coöperate with certain government officials. Myron Colony, of the Cotton Exchange, was appointed to make a secret investigation of the frauds. The disclosures that followed implicated the private secretary of President Grant, the chief clerk of the Treasury Department, and many other government officials. Indictments were obtained against 238 persons, many of whom were convicted and fined. The amount involved in the frauds aggregated $1,650,000.

WHIST, a game played with the full pack of 52 cards, so named because it requires great attention and silence. The game requires four persons, of whom those sitting opposite to each other are partners. At the beginning the pack is cut for partners, the two cutting respectively the highest and lowest cards play together, and the first deal is taken by the one who cuts the lowest card. After shuffling the cards carefully, the pack is cut by the adversary sitting on the right hand, and the cards are then dealt one by one to each of the players, commencing on the left, until the pack is exhausted. The last card, called the *trump,* is turned up by the dealer and remains exposed until the first trick is turned. In 1743 Edmond Hoyle published a set of rules in his "Short Treatise on the Game of Whist," and it remains substantially in force at the present time. However, the rules differ somewhat in various countries and those wishing to study them should refer to a guide. A standard work on the subject is Cavendish's "Principles of Whist, Stated and Explained."

WHISTLER (hwĭs'lẽr), **James Abbott McNeill,** artist, born in Lowell, Mass., in 1834; died July 17, 1903. After graduating from the United States Military Academy, West Point, he studied art in France, and in 1863 became a resident of London. He was chosen president of the British Society of Artists in 1886. His productions are very numerous and are much admired because of the harmonies and contrasts of color which he so effectually obtained. Among his best known works are "Harmony in Brown and Black," "The Gold Girl," "Harmony in Gray and Green," and "Nocturne in Blue and Silver." His portraits include one of Thomas Carlyle and one entitled "My Mother." He published "Four Masters of Etching," "The Gentle Art of Making Enemies," and "Ten O'clock."

WHITBY (hwĭt'bĭ), a seaport city of England, in Yorkshire, on the North Sea. It occupies a fine site on the Esk River, but many of the streets are narrow and platted irregularly. It has had some growth in population and trade



(Opp. 3139) EDWARD DOUGLASS WHITE.

Judge White was appointed Chief Justice of the United States Supreme Court by President Taft in 1910.

since the construction of a railway line to the port, but it is noted chiefly for its history. In the time of Queen Elizabeth it ranked as a center of manufactures of alum, and in its shipyards were built the vessels used by Captain Cook in his exploring expeditions. The most noteworthy building now in the city is the parish church, which occupies a position on a cliff about 350 feet high and is reached by a flight of 210 steps. It has excellent herring fisheries and quarries of ironstone. The fine scenery in the vicinity and several mineral springs have stimulated interest in it as a popular summer resort. Population, 1918, 12,843.

WHITE, Andrew Dickson, educator and diplomatist, born in Homer, N. Y., Nov. 7, 1832. He studied in the public schools of Syracuse and at Yale University, graduating from the latter in 1853. In 1857 he became professor of history and English literature in the University of Michigan and in 1867 was made president of Cornell University, which position he held until 1885. On resigning the presidency, he made the university a gift of his historical library, comprising about 30,000 volumes, and a quantity of valuable equipments. He traveled in Europe from 1867 to 1868, was appointed a commissioner to Santo Domingo by President Grant in 1871, and was made minister to Germany by President Hayes in 1879, remaining absent from Cornell for two years. President Cleveland appointed him on the commission to investigate the Venezuela boundary line in 1896, and President McKinley made him ambassador to Germany the following year, the duties of which position he performed with eminent ability. White was honored by an appointment as regent of the Smithsonian Institution and as a member of the Legion of Honor of France. His writings include "Lectures Relating to Cornell University," "Coeducation of the Sexes," "The New Germany," "History of the Warfare of Science with Theology," "A History of the Doctrine of Comets," "Reminiscences of My Diplomatic Life," and "The Warfare of Humanity With Unreason."

WHITE, Edward Douglass, jurist, born in the parish of Lafourche, La., Nov. 3, 1845. After studying at Mount Saint Mary's College, Emmittsburg, Md., he pursued a course at the Jesuit College of New Orleans and at Georgetown College, D. C. He served in the Confederate army, studied law after the close of the war, and in 1868 was admitted to the Louisiana bar. In 1874 he was elected State senator of Louisiana and four years later became an associate justice of the Louisiana supreme court. He succeeded James B. Eustis in the United States Senate as a Democrat in 1891, and was appointed as associate justice of the United States Supreme Court by President Cleveland in 1894. His addresses and decisions give evidence of much ability. He died May 19, 1921.

WHITE, Emerson Elbridge, author and lecturer, born in Portage County, Ohio, in 1829; died Oct. 21, 1902. He attended the public schools and Cleveland University, after which he was a grade teacher in the schools of Cleveland. In 1856 he was made superintendent of schools at Portsmouth, Ohio, was for some time publisher of the *Ohio Educational Monthly,* and in 1863 became State school commissioner. He was elected president of Purdue University, Lafayette, Ind., in 1876, and was superintendent of schools in Cincinnati from 1886 to 1889. He is best known by a series of text-books and works on education, which are in extensive use in public schools and colleges. His professional books include "School Management" and "Elements of Pedagogy."

WHITE, Gilbert, naturalist, born at Selborne, England, July 18, 1720; died June 20, 1793. He studied at Oriel College, Oxford, where he became a fellow in 1844, which position he retained throughout his life. His most important writings appeared in 1789 under the title "Natural History and Antiquities of Selborne," which contains interesting accounts of birds, insects, trees, and flowers. This work is commended by Darwin because of its accuracy in describing nature.

WHITE, Henry, diplomat, born in Baltimore, Md., March 29, 1850. He was educated under private tutors in the United States and France, received degrees from Harvard and Johns Hopkins, and became attached to the legation at Vienna. Subsequently he was ambassador to Italy and France. President Wilson appointed him one of the American commissioners at Paris Peace Congress in 1919.

WHITE, Henry Kirke, poet, born in Nottingham, England, March 21, 1785; died Oct. 19, 1806. He was apprenticed to a weaver, but afterward studied law. Several verses written by him in his fifteenth year were published in magazines and subsequently he became a regular contributor to the *Monthly Mirror.* A volume of poetry entitled "Clifton Grove" won a scholarship at Cambridge, where he became a tutor in mathematics. He died from excessive study while at Cambridge.

WHITE, Horace, journalist, born at Colebrook, N. H., Aug. 10, 1834; died Sept. 16, 1916. He graduated at Beloit College, Wisconsin, in 1853, and became a writer for the Chicago *Tribune.* In 1865 he became its editor and in 1883 accepted a position as editorial writer for the *Evening Post,* New York. He retired from the position of editor in chief in 1903, after which he gave his time largely to literature. His books include "The Roman History of Appian of Alexandria" and "Money and Banking Illustrated by American History."

WHITE, Hugh Lawson, public man, born in Iredell County, North Carolina, Oct. 30, 1773; died April 10, 1840. He settled at Knoxville, Tenn., at an early age and in 1793 became a volunteer against the Cherokee Indians. Later he studied law in Pennsylvania and began to

practice in Knoxville, where he was made judge of the State supreme court in 1801. He was appointed United States district attorney in 1807, and became State senator two years later. In 1825 he succeeded Andrew Jackson in the United States Senate. He was nominated for President of the United States by the Legislature of Tennessee in 1836, when he carried the State by a large majority. The only other State carried by him was Georgia, giving him a total of 26 electoral votes. Later he joined the Whig party, but resigned from the Senate of the United States because the State Legislature instructed him to vote for the subtreasury bill. His friends spoke of him as the "Cato of the United States," owing to his devotion to principle.

WHITE, Richard Grant, author, born in New York City, May 22, 1821; died there Aug. 8, 1885. He took a college course in law and medicine, but soon gave up the practice of both for a literary career. In 1845 he became connected with the New York *Courier and Enquirer,* of which he was the editor from 1855 to 1859. Besides being an efficient editorial and general writer, he was noted as a musician and art critic. In 1853 he published his first volume, entitled "Hand-Book of Christian Art," and at the time of the Civil War wrote "The Gospel of Peace," a critical satire on sympathizers with the Confederate cause. Many of his essays and criticisms were published in the *Atlantic Monthly* and in *Putnam's Magazine.* His best known works include "Words and Their Uses," "The Fate of Mansfield Humphrey," "National Hymns," "England Without and Within," "Biographical and Critical Hand-Book of Christian Art," and "Studies in Shakespeare."

WHITE, Stewart Edward, novelist, born in Grand Rapids, Mich., March 12, 1873. He studied at the high school in his native city, graduated from the University of Michigan in 1895, and studied law at the Columbia Law School. His early life was spent in the forests of his native State, where he came in touch with the scenes that enabled him to interweave his writings with many sketches taken from nature. His books include "The Blazed Trail," "The Conjuror's House," "The Magic Forest," "The Mountain," "The Silent Places," and "The Blazed Trail Stories."

WHITE, William, clergyman, born in Philadelphia, Pa., April 4, 1748; died there July 17, 1836. In 1765 he graduated at the College of Philadelphia and, after taking a theological course, became rector of Saint Peter's Church, Philadelphia, in which he served from 1779 until his death. The University of Pennsylvania conferred a degree upon him in 1832. He became bishop of the diocese of Pennsylvania, in 1786, and the following year was consecrated by the Archbishop of Canterbury in Lambeth Palace Chapel, England. He joined Bishop Seabury of Cincinnati in revising the "Book of Common Prayer," which was long in common use in the American Episcopal Church. Among his writings is "Memoirs of the Protestant Episcopal Church in the United States."

WHITE, William Allen, author and journalist, born at Emporia, Kan., in 1868. He studied in the public schools and at the University of Kansas, and in 1890 became editor of the Eldorado *Daily Republican.* Subsequently he was associated for some years with newspapers in Kansas City and Emporia. He became well known in 1896 by publishing an editorial under the caption "What's the Matter With Kansas?" This article was reprinted throughout the country. His books include "The Court of Boyville," "The Real Issue," and "Strategems and Spoils."

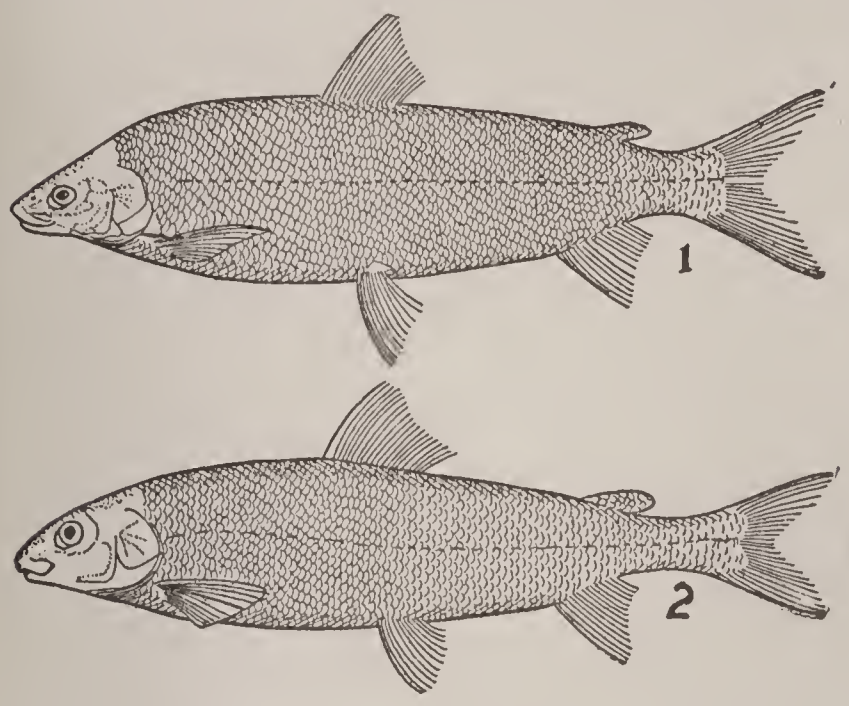
WHITEBAIT, a class of small fishes of the herring family, which are particularly abundant at the mouth of the Thames, England, where they are caught in large quantities. They are from three to six inches long, have a pale ashy-green color above, and the sides and lower parts are white. These fishes come up the river with the tide, especially in the spring and summer. They are considered a delicacy by the aristocracy of London, where they are served on festal occasions.

WHITE CAPS, the name applied in the United States to a mass of people who assume the punishment of persons for real or imaginary offences. Bodies of this kind were formed in places where the law delayed punishment, or the penalty imposed was thought too light, hence those who joined such movements undertook to administer what they considered proper punishment. The name was applied from the large white caps worn to conceal identity. In some instances the punishment consisted only of warning people to leave a neighborhood, but in other instances violence and injustice were perpetrated upon innocent parties.

WHITEFIELD (hwīt'fēld), **George,** eminent clergyman, born in Gloucester, England, Dec. 16, 1714; died in Newburyport, Mass., Sept. 30, 1770. He entered Oxford University in 1833, where he became interested in the doctrine and practice of the Methodists and formed a close friendship with John Wesley. In 1836 he was ordained deacon and shortly after made several evangelizing tours in England, but in 1836 proceeded as a missionary to Georgia. He returned to England after three months, but, being slighted by the clergy, he began to preach in the open air. His powerful oratory attracted thousands of people, while his voice was sufficiently strong to reach the utmost limits of his vast assemblages. A slight difference in doctrine caused him to withdraw from the Wesleyan communion, and Whitefield henceforth became known as the founder of the Calvinistic Methodists in Great Britain. He visited Scotland, Wales, and America at different times, laboring

in each country with unremitting perseverance. His death occurred at Newburyport, Mass., while on his seventh evangelizing tour in America.

WHITEFISH (hwīt'fĭsh), the name commonly applied to several species of fishes of the salmon family. They are found mostly in the



1, Common Whitefish.
2,Rocky Mountain Whitefish.

lakes of the northern regions of North America and are generally favored among the food fishes. About twenty species are native to the lakes of the northern part of the United States and Canada, and in many cases find their way far up the rivers and smaller streams. They usually weigh twelve to fourteen ounces, but the larger species reach four to eight pounds. The common whitefish of the Great Lakes is the most important of the species. Other fishes frequently mentioned as whitefish include the menhaden, the silver salmon, the sewen, and the European whiting.

WHITE HOUSE, the official residence of the President of the United States, in Washington, D. C., so called because it is painted white. It is located on Pennsylvania Avenue, a mile and a half from the Capitol. The original structure was commenced in 1792, when the cornerstone was laid, and the building was completed in 1800. John Adams was the first President to occupy the mansion. The British captured Washington in 1814 and burned the White House together with the Capitol and other buildings, but its restoration was authorized by Congress the following year. In 1818 the new structure was ready to be occupied, which has since been the official presidential residence. The building is modeled after the house of the Duke of Leinster at Dublin, Ireland, is 170 feet long and 86 feet wide, and has a beautiful colonnade in front and a circular porch in the rear. An attractive park with fine walks and beautiful plants surrounds the building. Formerly the executive business was transacted largely in the White House, but separate offices were erected for that purpose a short distance from the building in 1903.

WHITE LADY, in German legends, a feminine spirit reputed to appear in the castles of German princes and nobles at the approach of an important event. She is represented in story as robed in beautiful garments of white and at her side is a bunch of keys, with which she is enabled to pass into the different apartments. Some of the beautiful legends connect her with the nursery, where she rocks and watches over the slumbering children at night. The most famous legend connected with the White Lady is that known as "Bertha of Rosenberg," in Bohemia, and next to it is the creation of Sir Walter Scott, called "The White Lady of Avenel."

WHITE LEAD, a dense, white powder. It is soluble in diluted nitric or acetic acid, but is insoluble in water. It is manufactured by the joint action of carbonic dioxide and vapor of acetic acid on metallic lead. The most common process is to place rolled sheets of lead in earthen pots and pour over them a quantity of acetic acid, that is, vinegar. A large number of these pots are prepared and loosely covered with disks of lead, after which they are covered with refuse bark from tanneries and set away for a period of five to six weeks. In the meantime the substances undergo a slow oxidation and disengage carbonic dioxide, which in the presence of the vinegar converts the surface of the lead into carbonate. The pots are opened and the white lead is scraped from the remaining metal as soon as a considerable quantity of carbonate has been formed. A number of other processes are employed to facilitate the manufacture of white lead more cheaply, but this process is employed as the most suitable for obtaining a fine quality. White lead is used extensively in painting, not only white, but many shades of color are added to it to produce the desired effect.

WHITE MOUNTAINS, a mountain chain of New England, which is situated chiefly in New Hampshire and belongs to the Appalachian highlands. It extends from eastern Maine nearly across New Hampshire, but assumes the greatest heights and largest extent in the latter State. Mount Katahdin, north of Millinoket Lake, is the highest elevation of eastern Maine, height 5,385 feet, and Mount Washington, height 6,288 feet, is the most elevated peak of the mountain group. The latter is situated in north central New Hampshire and is noted as a favorite resort for summer visitors. A mountain railway, consisting of three rails, was built to the summit of Mount Washington in 1869. A station of the Federal weather bureau and a hotel are located at the summit. Many villas and hotels are maintained in the vicinity for the accommodation of tourists.

The western part of the White Mountains is known as the Franconia Mountains. It contains Mount Lafayette, whose summit is 5,270 feet high, and a number of others which exceed 4,000

feet, including Profile, Liberty, and Moosilaukee mountains. A celebrated natural feature of Mount Profile, consisting of three projecting rocks, resembles a human profile and is known as the *Old Man of the Mountain.* Hawthorne based his beautiful allegory "The Great White Face" on this phenomenon. The summits of the White Mountains are generally rocky and bare, but fine forests originally covered the slopes.

WHITE PLAINS, a town in New York, county seat of Westchester County, 22 miles northeast of New York City, on the New York Central Railroad. It is surrounded by a fertile farming and dairying region. The features include the public library, the high school, and many attractive residences. It is the seat of Alexander Institute and the Bloomingdale Insane Asylum. White Plains is noted as the scene of a battle in the Revolution, which occurred Oct. 28, 1776. The place was held by the Americans under Washington and was attacked by the British under Howe, who came from New York with the view of breaking the blockade by getting in the rear of the American position. Though the latter obtained possession of an unimportant outpost, Washington held the grounds commanding White Plains until in November, when Howe fell back to Dobbs Ferry and Washington removed his troops to New Jersey. The place was incorporated as a town in 1788. Population, 1905, 11,579; in 1920, 21,031.

WHITE RIVER, a stream of Indiana, formed by two branches near the eastern boundary of the State, near the border of Pike County. It has a general course toward the southwest until it joins the Wabash opposite Mount Carmel, Ill. From the junction of the two branches to its mouth is a distance of 50 miles. The entire length, including the West Fork, is 350 miles. Indianapolis is the chief city on the West Fork.

WHITE RIVER, a river of the United States, which rises in the Ozark Mountains of Arkansas and flows into the Mississippi near the mouth of the Arkansas River. It first courses toward the northeast, making a large curve through Missouri, but most of its course is toward the southeast. The White River is 800 miles long, of which 350 miles are navigable. The Black River, which rises in southern Missouri, is its chief tributary. A large portion of the White River valley is fertile, producing cereals, cotton, tobacco, grasses, and fruits.

WHITE SEA, an inlet from the Arctic Ocean, in northern Russia, sometimes called the Gulf of Archangel. It extends inland for a distance of 380 miles, varies in breadth from 30 to 150 miles, and comprises an area of 46,500 square miles. The Gulf of Kandalasksha is in the northwestern part and Onega Bay is in the southwestern part. The coast line, which embraces 975 miles, is largely precipitous. Into it flow the Mezen, Dvina, Onega, and Wyg rivers. Though the surface is frozen from October to May, it is important for commercial purposes and contains excellent cod and herring fisheries. The navigation is connected by canals with the Volga and Dnieper, thus bringing it into direct communication with the Black and Caspian seas.

WHITING (hwīt'ĭng), a fish closely related to the cod tribe, but differing from it in not having a barbel on the lower jaw. The body is moderately long and covered with small scales, the upper jaw protrudes, and the mouth is deeply cleft. It is usually from twelve to sixteen inches long and weighs from one to three pounds. The whiting is abundant in the seas of Northern Europe and is taken in large numbers off the shores of Great Britain. The name whiting is often applied to the hake and the kingfish of North America.

WHITMAN (hwĭt'mạn), a town of Massachusetts, in Plymouth County, twenty miles southeast of Boston, on the New York, New Haven and Hartford Railroad. The streets are regularly platted. It has a public library, waterworks, electric lighting, and a number of fine schools and churches. The manufactures include boots and shoes, hardware, wire nails, clothing, and machinery. Originally it was a part of Abington, but it was incorporated as South Abington in 1875, and the present name was adopted in 1886. Population, 1920, 7,147.

WHITMAN, Charles Otis, zoölogist, born in Woodstock, Me., Dec. 14, 1842. He graduated at Bowdoin College in 1868 and subsequently at the University of Leipsic, and in 1880 was made professor of zoölogy at the Imperial University of Tokio, Japan. From 1883 to 1885 he was assistant in zoölogy at Harvard University, from 1886 to 1889 was director of the Allis Lake Laboratory at Milwaukee, and from 1890 to 1892 professor of zoölogy at Clark University. He was made professor of zoölogy in the University of Chicago in the latter year, in which position he did much to extend knowledge in particular lines of embryology and the anatomy of fishes. His publications include "The Seat of Formative and Regenerative Energy," "Evolution and Epigenesis,' "The Kinetic Phenomena of the Egg During Maturation and Fecundation," "Animal Behavior," and "Methods of Research in Microscopical Anatomy and Embryology."

WHITMAN, Walt, poet, born in West Hills, Long Island, N. Y., May 31, 1819; died in Camden, N. J., March 25, 1892. He had a public school education and began life as a printer, but taught in the common schools during the winter months. In 1847 he started on an extensive tour of the United States and Canada, and traveled hundreds of miles by boats on the great rivers. Subsequently he founded the New Orleans *Crescent* and in the Civil War ministered to the wants of the wounded and sick soldiers of both armies in the vicinity of Washington and in Maryland. The remarkable en-

ergy with which he attended to those needing care exhausted his strength and finally ruined his health.

Whitman was stricken with paralysis while at Washington, in 1873, where he had been employed as a clerk for many years. Shortly after he removed to Camden, where he made his home until his death. "Leaves of Grass," a series of poems devoted to social, moral, and political problems, is the chief work of Whitman and first appeared in 1855. Some critics highly laud his poetical writings, while others condemn them with equal strength. It is possible that his admirers are a little too enthusiastic in his praise, but it is altogether certain that the unfavorable criticism of him is too severe. The writings of Whitman are apparently attracting more attention at present than ever before, and in a number of cities growing Walt Whitman societies are maintained. His writings embrace "Specimen Days and Collect," "November Boughs," "Democratic Vistas," "Drum-Taps," "Two Rivulets," "Passage to India," "As Strong as a Bird on Pinions Free," "Sands at Seventy," and "After All Not Only to Create."



WALT WHITMAN.

WHITNEY (hwĭt'nĭ), **Adeline Dutton Train,** author, born in Boston, Mass., Sept. 15, 1824; died March 20, 1906. She was a sister of George Francis Train and in 1843 married Seth D. Whitney of Milton, Mass., where she resided permanently. Her writings are numerous, including about twenty volumes, and they furnish pleasant and wholesome reading. Among her leading books are "Mother Goose for Grown Folks," "Sights and Insights," "The Other Girls," "The Gayworthys," "A Golden Gossip," and "Friendly Letters to Girl Friends."

WHITNEY, Asa, manufacturer, born in Townsend, Mass., Dec. 1, 1791; died in Philadelphia, June 4, 1874. His education was limited, being employed a large part of his time in the blacksmith shop of his father, but he became an expert machinist by the time he attained his majority. He was engaged for a number of years at Brownville, N. Y., where he managed an extensive machine business, and in 1839 was elected canal commissioner of New York. In 1842 he removed to Pennsylvania, where he joined Matthew W. Baldwin in the manufacture of locomotives, and later founded a car-wheel factory. He patented a process to anneal car wheels, in 1848, and it may be said that his invention marks an important era in railroad construction. Whitney was president of the Reading Railroad for some time. He made many contributions to charitable and educational institutions, among them a gift of $50,000 to the University of Pennsylvania, $20,000 to the Old Men's House in Philadelphia, and $12,500 to the Franklin Institute.

WHITNEY, Eli, inventor, born in Westborough, Mass., Dec. 8, 1765; died in New Haven, Conn., Jan. 8, 1825. His desire to obtain an education was gratified by attending Yale University, but not without considerable personal effort to secure the necessary money to support himself. The expenses were paid by teaching school and working at odd jobs during vacations, but he finally graduated in 1792 and afterward taught school in Georgia. While in the South he was assisted by the widow of General Greene, an officer of the Revolutionary War, thus enabling him to pursue the study of law. Whitney observed that the process of separating the cotton from the seed by hand was slow and expensive and accordingly undertook to invent a machine that would do the work. Since he was limited in means, he was obliged to make his own tools and prepare much of the material at a disadvantage. When his machine was about completed, some one broke into his workshop and stole his devices, thus enabling others to copy them and get machines made before he could have his own invention patented.



ELI WHITNEY.

In 1793 Whitney finally completed the cotton gin and was voted a fund of $50,000 by the State of South Carolina to develop its manufacture. Though the invention of the cotton gin was one of the most important connected with the cotton industry, he secured little profit, since he was obliged to defend his rights by many expensive lawsuits against the claims of others. The government gave him a contract for the manufacture of firearms and he established himself at Whitneyville, Conn., where he made a fortune by adapting ingenious machinery for manufacturing the different parts of firearms. It may be said that he was one of the first American manufacturers to take advantage of the division of labor, thus securing the benefits resulting from the application of skill to the parts most effectually made by each laborer. Macaulay said of him, "What Peter the Great did to make Russia dominant, Eli Whitney's invention of the cotton gin has more than equaled in its relation to the power and progress of the United States."

WHITNEY, William Collins, public man, born at Conway, Mass., July 5, 1841; died Feb.

2, 1904. He studied at Yale University and at the Harvard Law School and in 1865 began to practice law in New York City. In 1872 he was made inspector of the city schools and three years later became corporation counsel. In city politics he opposed the "Tweed Ring." President Cleveland appointed him Secretary of the Navy in 1885, in which position he promoted the movement to construct larger vessels for the navy. In 1892 he managed the campaign for the Democratic party. Subsequently he was identified with numerous financial projects and enterprises in New York.

WHITNEY, William Dwight, philologist, born in Northampton, Mass., Feb. 9, 1827; died June 7, 1894. He was a brother of Joshua D. Whitney (1819-1896), the geologist, and was educated at Williams College, Williamstown, and at Yale University. In 1850 he went to Germany, where he studied Sanskrit and other languages in Berlin and Tübingen, and in 1854 became professor of Sanskrit in Yale University. He was made professor of comparative philology in that institution in 1870. Whitney had more than a national reputation as a writer and an expositor of the science of language. His chief works include "German Grammar," "Sanskrit Grammar," "Life and Growth of Languages," "German Reader," and "Oriental and Linguistic Studies." He was the chief editor of *The Century Dictionary,* published in 1891.

WHITTIER (hwĭt'tĭ-ẽr), **John Greenleaf,** eminent poet, born near Haverhill, Mass., Dec. 17, 1807; died in Hampton Falls, N. H., Sept. 7, 1892. He was born on a farm near Haverhill. His parents were Quakers and he worked on the farm until he was eighteen years of age, but devoted all his leisure time to reading and study. His education was limited to the schools of the country district and two years' study at the Haverhill Academy. In the meantime he learned the shoemaker's trade, but early devoted himself to writing for various periodicals. In 1830 he became editor of the *New England Weekly Review,* a newspaper at Hartford, Conn., but two years later returned to his native town to edit the Haverhill *Gazette.* He removed to Philadelphia and became the editor of the *Pennsylvania Freeman,* but his office was burned by a mob in 1839, owing to his ardent support of the abolition cause.



J. G. WHITTIER.

Whittier was a leading influence in organizing the American Anti-Slavery Society at Philadelphia and by the excitement of the times was inspired to write many poems devoted to the antislavery cause, which he published under the title of "Voices of Freedom." In 1840 he settled at Amesbury, Mass., where he devoted himself to literature and to the position of corresponding editor of the Washington *National Era.* Many critics have spoken of Whittier as a born poet. Everything that he came in contact with seemed to have given him poetic inspiration. His style is like the man, plain, but strong. Although his verse is simple, yet its truthfulness and delicacy touch the higher sensibilities of the soul. A man of deep moral and religious convictions, he gave to the world gems of writings that, like himself, always influence for good. His best known and most admired productions include "Legends of New England," "Home Ballads," "Among the Hills," "Pennsylvania Pilgrims," "Songs of Labor and Other Poems," "Snow-Bound, a Winter Idyl," "Miriam, and Other Poems," "Hazel Blossoms," "Lays of My Home," "In War Time, and Other Poems," "Centennial Hymn," "Poems of Nature," "Moll Pitcher," and "Complete Poetical Works." His familiar poems include "Maud Muller," "The Barefoot Boy," "Among the Hills," "Barbara Frietchie," and "Telling the Bees."

WHITTINGTON (hwĭt'ĭng-tŭn), **Sir Richard,** mayor of London, born in Pauntley, England, about 1359; died in 1423. He was the son of Sir William Whittington, who lost his estate on account of political complications. In 1379 he was able to loan five marks, which he had saved by working for a merchant, and henceforth fortune smiled upon him. He was elected alderman of London in 1392 and was chosen mayor of the city four different times. In 1416 he became a member of Parliament and was subsequently knighted by Henry V. From personal savings he was able to make loans to Henry IV. and Henry V., the latter granting him a lien on the customs of London as security.

WHOOPING COUGH (hōōp'ĭng kạf), an infectious and convulsive cough which is sometimes epidemic among children, but frequently affects adults. It is accompanied by short and sudden acts of noisy expiration, followed by a long and whooping inspiration. Though it usually occurs but once in the life of an individual and generally during infancy, some persons are attacked two or more times. It is most frequent in the spring and autumn. The symptoms are similar to those of a severe cold and the cough peculiar to the affection appears at the end of five or six days, accompanied by a watery discharge from the nose and eyes, considerable feverishness, and oppressive feeling in the chest. The period is usually from three to four weeks, but in some cases it continues much longer, sometimes even two months. Ordinarily the disease is not dangerous, but it is sometimes complicated with bronchitis and pneumonia, when careful medical treatment is neces-

sary. Severe cases are accompanied by spasmodic symptoms.

WHORTLEBERRY (hwûr'tl-bĕr-rў), the name of any plant of an extensive genus of shrubs, more commonly known as huckleberry, which see.

WICHERN (vĭk'ĕrn), **Johann Heinrich,** philanthropist, born in Hamburg, Germany, April 21, 1808; died there April 7, 1881. After attending the public schools, he studied theology in Göttingen and Berlin, and in 1833 established near Hamburg a reformatory for children, known as the Rauhes Haus. It was opened with twelve inmates, but at present has 24 buildings and many hundreds of attendants. The institution is organized on the plan of the industrial schools of Canada and the United States, teaching the inmates the elements of an education along with various industries, such as agriculture, beekeeping, bookbinding, baking, shoemaking, tailoring, etc. In 1844 he established a monthly periodical, known as the *Publication of the Rauhes Haus.* Subsequently he was chief of the penal and correctional institutions of Prussia. He published "The Inner-Mission of the German Evangelical Church," "Our Songs," and "Festival-Book of the Rauhes Haus."

WICHITA (wĭch'ĭ-tą), a city of Kansas, county seat of Sedgwick County, on the Arkansas River, 160 miles southwest of Topeka. It is on the Missouri Pacific, the Atchison, Topeka and Santa Fé, the Saint Louis and San Francisco, the Chicago, Rock Island and Pacific, and other railroads. The city is surrounded by a fertile farming and stock-raising country. The streets are paved substantially, lighted by gas and electricity, and traversed by an extensive system of electric railways. It has fine county buildings, many well-constructed public schools and churches, and a public library of 15,000 volumes. The county courthouse is a fine stone structure which cost $200,000 and the city hall was erected at a cost of $100,000. It is the seat of the Friends' University, Lewis Academy, a medical college, and a Catholic college. Other features include the Martha Washington Home, the Scottish Rite Masonic Cathedral, the Fairmont College, the Federal post office, and the Wichita and Saint Francis hospitals. Among the manufactures are flour, cigars, lumber products, clothing, machinery, ironware, and farming implements. Wichita has large packing establishments and is an important market for cereals, live stock, dairy products, and vegetables. It was settled in 1869 and incorporated in 1872. Population, 1904, 31,857; in 1920, 72,128.

WICHITA, a tribe of North American Indians, formerly resident in the portion of Oklahoma that lies between the Red and the Wichita rivers, including the region of the Wichita Mountains. According to tradition, they migrated north from Louisiana and settled in Arkansas, after which they crossed north to the region lying beyond the Red River. In 1859 they were assigned to a reservation on the north side of the Wichita, in the vicinity of Anadarko, Okla. These Indians are industrious and became self-supporting soon after the Civil War. Many have intermarried with the whites.

WIDGEON (wĭj'ŭn), the name of a genus of river ducks, closely allied to the teal and the gadwall. The bill is shorter than the head. It is of equal width throughout and the tip is much rounded. The wings are long and pointed and the toes are fully webbed, but the hind one is lobed. Ten species have been described, nearly all of which are found in the colder regions and usually on the margin of rivers and lakes. The *bald pate,* an American species, is about 22 inches long and is found in Canada and the northern part of the United States, especially in Minnesota. In winter it migrates southward to the interior of the United States.

WIELAND (vē'länt), **Christoph Martin,** poet and novelist, born in Oberholzheim, Germany, Sept. 5, 1733; died Jan. 20, 1813. He was the son of a pastor, under whose direction he received a careful primary training. After spending several years at the school of Klosterbergen, near Magdeburg, he entered the University of Tübingen with the view of studying law, but most of his time was devoted to literature. In 1752 he published "The Nature of Things" under an assumed name and, after completing his college work, he settled as an advocate at Biberach. In 1769 he became professor of philosophy in the University of Erfurt, where he taught successfully until 1772, when he removed to Weimar as tutor to the young duke Charles Augustus. While there he contributed to a number of periodicals, wrote many of his excellent romances and poems, and maintained a friendly relationship with Goethe and Schiller.

Wieland ranks among the most eminent authors of Germany. His writings are characterized by grace and harmony of expression and versification, and through him German poetry received many excellent additions. "Oberon" is considered his greatest poem and still has a wide circle of readers, both in the original and the many translations that have been made. Other writings include "Impeachment of Love," "History of the Abderites," "Gods and Heroes," "Choice of Hercules," "Moral Tales," "Comical Stories," "Aristippus and Several of His Associates," and "Trial of Abraham's Faith." He published a monthly periodical called the *German Mercury* and made translations from Horace and Cicero. On the Wielandsplatz at Weimar is a fine bronze statue of him by Gasser.

WIESBADEN (vēs-bä'dęn), a city of Germany, in the province of Hesse-Nassau, 26 miles west of Frankfort-on-the-Main. It is situated two miles from the Rhine, at the foot of Mount Taunus, and has excellent railroad facilities. The city is the most fashionable and popular

watering place in Germany, receiving many thousands of visitors annually, and is supplied with extensive hotels. The streets are beautifully paved, have gas and electric lighting, and are traversed by a system of electric street railways. It has many beautiful buildings, including the palace, several fine Protestant and Roman Catholic churches, a library with 75,000 volumes, a synagogue of Moorish architecture, and the Kursaal, an extensive tavern. In the vicinity are numerous saline springs, some cold and others warm. The Kochbrünnen are the most remarkable, having a temperature of 156° Fahr. The Romans were acquainted with the springs of Wiesbaden and near the place are remains of baths, walls, and a military station of Roman construction. The city is supported quite largely by summer visitors, but has large manufacturing interests and a considerable trade in produce and merchandise. Population, 1905, 100,953; in 1920, 109,033.

WIGAN (wĭg′ăn), a city of England, in Lancashire, eighteen miles northeast of Liverpool. It is on the Douglas River and is surrounded by a rich farming and coal-producing region. The city has connections by a number of railways and canals. Among the chief buildings are the All Saints' Church, the Albert Edward Infirmary and Dispensary, and a number of fine public schools and churches. It has modern municipal improvements, such as pavements, waterworks, a public library, and rapid transit by electric railways. A beautiful park of 27 acres is the chief place of recreation in the summer time. The manufactures include machinery, cotton and woolen goods, hardware, chemicals, spirituous liquors, railway cars, paper, and engines. Wigan was a station during the Roman occupation. Population, 1921, 89,171.

WIGGIN (wĭg′gĭn), **Kate Douglas.** See **Riggs, Kate Douglas Wiggin.**

WIGHT (wīt), **Isle of,** an island in the English Channel, which is separated from the mainland by the Solent and the Spithead, forming a part of the county of Hants. The length from east to west is 23 miles; breadth, thirteen miles; and area, 146 square miles. Much of the surface is elevated, but it is diversified with hills and dales. The island has long been noted for its beautiful scenery and interesting geology. It is visited by many tourists. The chief streams are the Medina, Yar, and Brading. Along the southern coast is the district known as the Under Cliff, where several hospitals are maintained for invalids. It has manufactures of cement and considerable shipbuilding. Sheep raising and fruit and vegetable culture are pursued with success. Newport is the government center. Other towns include Yarmouth, Ventnor, Cowes, Freshwater, and Bembridge. Several railroads and electric car lines are in successful operation. It has a number of landmarks dating from Roman occupation, chiefly near Brading. Carisbrooke Castle, in which Charles I. was imprisoned for some time, is an interesting ruin. Population, 1911, 88,193.

WIGWAM (wĭg′wŏm), the name applied to a house built by the Indians of North America, especially one made of bark or matting in the form of a hut or cabin. Such a structure is built with a framework of saplings or small trees, which are set in the ground and converge at the top, where an opening is left for the escape of the smoke. Some tribes covered the framework with skins, while others used bark or braided mats of grass. In winter a fire was built in the center of the tent and mats were laid near the walls to serve as places to rest and sleep.

WILBERFORCE (wĭl′bĕr-fōrs), **Samuel,** clergyman, born at Clapham, England, Sept. 7, 1805; died July 19, 1873. He was a son of William Wilberforce, studied at Oriel College, Oxford, and in 1826 took orders in the Church of England. For some years he was rector of Brixton, Isle of Wight, and later preached before the University of Oxford. In 1845 he was made Bishop of Oxford and became lord high almoner to the queen. Although an opponent of ritualism, he was a leader of the High Church party. His wit and versatility in giving opinions caused him to be called *Soapy Sam.* Among his leading books are "Heroes of Hebrew History," "Sermons Preached Before the University of Oxford," "Note-Book of a Country Clergyman," and "A History of the Protestant Episcopal Church in America."

WILBERFORCE, William, philanthropist, born in Hull, England, Aug. 24, 1759; died July 29, 1833. He was educated at Cambridge University, where he excelled as a student, and in 1780 became a member of Parliament. In 1783 he joined Pitt in making a tour of France, where he studied the public institutions, and in 1784 was reëlected to Parliament for Yorkshire. While at Nice in the same year he was converted to the evangelical faith, after which he became devoted to the leading social and governmental reforms. About the same time he formed the acquaintance of Thomas Clarkson and joined him in the agitation against the slave trade. He advocated a law against permitting the further importation of African slaves into British colonies, which was finally adopted in 1807, and then began the agitation in favor of the total abolition of slavery. He was elected a vice president of the Anti-Slavery Society, formed in 1823, but retired from public life before the Emancipation Bill was passed, an event which took place shortly after his death. Wilberforce was not only active as an advocate of the liberation of slaves, but promoted many social and religious reforms. He was buried in Westminster Abbey, where a monument was erected to his honor.

WILCOX (wĭl′kŏks), **Ella Wheeler,** authoress, born in Johnstown Center, Wis., in 1855. She attended the public schools of Windsor and afterward pursued a course at the University of Wisconsin. In 1884 she was married to Robert

M. Wilcox, of Meriden, Conn., and three years later removed to New York City. She became a frequent contributor to magazines and other periodicals while she was at the university. In 1872 she published her first volume of poems under the title "Drops of Water." She not only contributed largely to American literature, but became a leading figure as a speaker and an advocate of woman's rights. Many of her short essays and criticisms were published in the New York *Journal,* the Chicago *American,* and other editions of the Hearst newspapers. Among her best known writings are "Poems of Pleasure," "A Double Life," "Poems of Passion," "Maurine," "Three Women," "An Ambitious Man," "A Woman of the World," "Every-Day Thoughts," "The Kingdom of Love," "The Beautiful Land of Nod," and "An Erring Woman's Love."



ELLA WHEELER WILCOX.

WILD CAT, or **Catamount,** the general name given to several species of wild animals The common wild cat of Europe formerly inhabited all parts of the continent, except the sections of the extreme north, and is still found in some of the forests and mountains. It is larger than the domestic cat and has a shorter and thicker tail. The limbs and body are longer and larger. This animal is supposed to be the source of many species of the domestic cat. The name wild cat is applied to the jungle cat of India, the chati or margay of Mexico, and the lynx of North America.

WILDE, Oscar Fingal O'Flagertie, author, born in Dublin, Ireland, Oct. 16, 1856; died Nov. 30, 1900. He studied at Trinity College, Dublin, and Magdalen College, Oxford, and in 1879 removed to London, where he became known for his interest in aesthetics. In 1895 he was arrested in London for gross offenses against society and was soon after sentenced to the penitentiary for two years, which caused him to be barred from society. Among his writings are "Lord Arthur Saville's Crime and Other Stories," "Guido Ferranto," "The Importance of Being Earnest," "The Duchess of Padua," and "The Picture of Dorian Gray."

WILEY, Harvey Washington, chemist, born at Kent, Ind., Oct. 18, 1844. He became State chemist of Indiana in 1881, serving until 1883, and was long a professor at Columbian University. Later he instructed at George Washington University and was chief chemist of the United States Department of Agriculture. He published "Principles and Practices of Agricultural Chemistry."

WILDERNESS, Battles of the, the name of a series of battles in the Civil War of America, sometimes spoken of collectively as the Battle of the Wilderness. It is so named from the general character of the region in which the contests occurred, where the vicinity was characterized by swamps and thickets of pine and scrub oak. General Grant had an army of 120,000 men and was supported by Meade, Hancock, and Burnside, while the Confederates under General Lee numbered about 80,000 men. The Federals crossed the Rapidan River on pontoons on the night of May 3, 1864, under the immediate command of General Burnside, and took a position at the margin of the Wilderness.

Lee anticipated the movement undertaken by Grant and began the attack early in the morning of May 5. The Confederates fully understood the locality, thus placing the Federals at some disadvantage in the almost impenetrable forests, which made it necessary to confine the fighting to musketry at close range. General Warren carried the brunt of the battle during the day, while the Confederates were led by General Ewell, and the day ended without little advantage to either side. In the meantime Grant ordered Hancock to move upon the scene from Chancellorsville, while he engaged the Confederates under General Hill in a drawn battle. Lee summoned Longstreet to reinforce Hill and by joint action attempted to force the Federals back across the Rapidan, but the hostilities ended on the approach of night. While neither side gained material advantage, the Confederates were unable to advance farther and the Federals failed to progress toward Richmond. The contest of two days in the Wilderness caused a loss of 11,400 men by the Confederates and 15,387 men by the Federals. A few days later occurred the Battle of Spottsylvania Court House.

WILHELMINA (vĭl-hĕl-mē′nȧ), **Helena Paulina Marie,** Queen of the Netherlands, born in The Hague, Aug. 31, 1880. Her father, William III., died in 1890, when she succeeded to the throne under the regency of her mother, Emma, the second wife of William III. and a daughter of Prince George Victor of Waldeck. The Salic law had been in force up to 1888, thus precluding female descendants from the throne, but her father succeeded in securing its annulment, thus insuring the right of succession to his daughter. She received a liberal and classical education under the guidance of



QUEEN WILHELMINA.

her mother and became accomplished in music and painting. Besides her own tongue, she acquired ability to speak fluently the German, French, and English. On Aug. 31, 1898, she attained to the age of eighteen years and according to the law of Holland became of legal age to assume full government. At that time she issued a proclamation expressing her gratitude for the loyalty of her people and her readiness to assume the responsibilities of actual sovereignty. She was officially enthroned in the Nieuwe Kerk, Amsterdam, on Sept. 6, 1898, amid great rejoicing. Her administration proved remarkably popular with the people. In 1901 she married Duke Henry Frederick of Mecklenburg-Schwerin, an officer in the German army, the occasion being celebrated with remarkable interest as a national holiday.

WILKES (wĭlks), **Charles,** naval officer, born in New York City, April 3, 1798; died in Washington, D. C., Feb. 8, 1877. He entered the navy in 1816 and three years later was sent to the Mediterranean, where he continued in the service until ordered to the Pacific, in 1821. After serving continuously until 1830, he was appointed to take charge of a department in the depot of charts and instruments at Washington, where he made the first astronomical observations in the United States by means of fixed instruments. In 1838 he was appointed to command an exploring expedition to the Samoan Islands, in the Pacific, and while on this tour explored the Fiji group and discovered many islands in the Antartic Ocean. He was made a captain in 1855 and in 1861 was given command of the United States steamer *San Jacinto*. While serving in that capacity he seized Mason and Slidell, who were sailing on the British mail steamer *Trent* as commissioners of the Confederate States to England and France, and removed them as captives to Boston. Although he received the thanks of Congress, the government finally released the prisoners at the demand of the British government, this incident being known as the Trent Affair. He was promoted to the rank of commodore in 1862 and at the close of the war was placed on the retired list. He published "Theory of the Winds," "Western America," "Meteorology" and "Hydrography."

WILKES, John, public man, born in London, England, Oct. 17, 1727; died Dec. 27, 1797. He studied at the University of Leyden, in the Netherlands, and spent some time in travel on the continent. In 1757 he was elected to Parliament for Aylesbury and soon became a fighter against the government. He published a paper entitled the *North Briton,* in which he severely criticised the speech made by the king to Parliament, for which he was arrested and committed to the Tower. Some technicality caused the prosecution to fail, but he was expelled from the House of Commons in 1764 and soon withdrew to France. Four years later he returned to England and was again elected to Parliament, but he was not permitted to serve, although the constituency of Middlesex elected him three times in succession. This gave rise to an extensive agitation known as *Wilkes and Liberty.* In 1770 he was set at liberty and became an alderman of London. The following year he was elected sheriff of London, of which city he became lord mayor in 1774. In the same year he was again elected to Parliament and permitted to serve. The long contest of Wilkes for a seat in that body established the precedent under which each constituency is accorded the right to choose its representative without interference of the Parliament.

WILKESBARRE (wĭlks′bär-rĭ), a city of Pennsylvania, county seat of Luzerne County, 142 miles northwest of Philadelphia. It is on the Susquehanna River, which is crossed by four bridges, and on the Lehigh Valley, the Pennsylvania, the Delaware, Lackawanna and Western, and other railroads. Electric railways furnish communication within the city and to many other commercial centers and inland points, including the Laurel line to Scranton, one of the finest three-rail lines in the country. The site is a beautiful tract of land overlooking the river, and the surrounding country produces large quantities of anthracite coal.

The streets are regularly platted and well improved by pavements of stone and macadam. Among the principal buildings are the county courthouse, the Osterhout free library with 35,000 volumes, the Wyoming historical museum, the Grand Army hall, the Young Men's Christian Association, and many fine business blocks. It has a thoroughly organized system of public schools, which terminates in an extended high school course. The city has several theaters, a number of fine hotels, and many well-constructed ecclesiastical buildings. Many of the streets are ornamented with shade trees, especially in the residential section, and the city maintains its waterworks and sewerage systems.

Wilkesbarre is important as a manufacturing and commercial center. The coal produced in the vicinity has been instrumental in building up vast industrial enterprises. Among the establishments are the machine shops of the Lehigh Valley Railway, breweries, flour and grist mills, cutlery works, and manufactories of silk and cotton goods. It produces large quantities of locomotives, clothing, automobiles, underwear, and machinery. The first settlement in the vicinity was made in 1769. In 1778 it was the scene of a conflict between the Americans and the Loyalists and Indians, on account of which the Wyoming Monument has been erected. It was made the county seat in 1786, incorporated as a borough in 1806, and chartered as a city in 1871. Many towns and boroughs of considerable size are located in the vicinity. Population, 1900, 51,721; in 1920, 73,828.

WILKIE (wĭl′kĭ), **Sir David,** painter, born

in Cults, Scotland, Nov. 18, 1785; died at sea off Gibraltar, June 1, 1841. An early inclination for art caused him to become skilled in drawing at school. He entered the Trustees' Academy at Edinburgh in 1799 to study art. His first notable painting is a subject picture entitled "Pitlessie Fair," which he completed on returning to Cults in 1804. It includes 140 figures, among which are several members of his family and a number of neighbors. In 1805 he established a studio in London and soon after became a member of the Royal Academy. Many of his paintings have been engraved. Some critics have placed his pictures in rank with the fiction of Scott and the poetry of Burns. The honor of knighthood was conferred upon him in 1836. His health gave way on account of close confinement to work. He sought to restore it in 1840 by making a trip to Palestine and Egypt, but died on his return voyage. His best known paintings include "The Village Politicians," "Callisto in the Bath of Diana," "Columbus in the Convent at La Rabida," "Empress Josephine and the Fortune Teller," "Napoleon and Pius VII. at Fontainebleau," "Queen Victoria Presiding at Her First Council," "The Maid of Saragossa," "John Knox Preaching Before the Lords of the Congregation," "Cotter's Saturday Night," "Sir David Baird Discovering the Body of Tippoo Sahib," and "Chelsea Pensioners Reading the Gazette of Waterloo."

WILKINSBURG (wĭl'kĭnz-bûrg), a borough of Pennsylvania, in Allegheny County, six miles east of Pittsburg, with which it is connected by electric railways and the Pennsylvania Railroad. The surrounding country produces large quantities of coal. Among the features are the Home for Aged Protestant Women, the public library, the high school, and the Presbyterian Home for the Aged. The manufactures include machinery, hardware, cigars, furniture, and clothing. It was formerly known as Rippeyville, but was given its present name in honor of William Wilkins, Secretary of War under President Tyler. Population, 1920, 24,403.

WILKINSON (wĭl'kĭn-sŭn), **Henry Spenser,** author and journalist, born at Manchester, England, May 1, 1853. He was educated at Owens College, Manchester, and at Merton College, Oxford, and in 1880 was admitted to the bar at Lincoln's Inn. Soon after he became connected with the Manchester *Guardian,* with which he continued until 1892, and subsequently was made a member of the staff of the London *Morning Post.* He traveled in India in 1892, visiting the Khyber Pass and many points of interest in the Punjab. His advocacy of a larger army and navy for Great Britain attracted much attention, and during the Boer War of 1899-1900 he increased his popularity by forecasting the military movements and their results of both British and Boers. Among his chief writings are "Essays Toward the Improvement of the Volunteer Forces," "Essays on the War Game," "Command of Artillery in the Army Corps and the Infantry Division," "The Great Alternative, a Plea for a National Policy," "The Nation's Awakening," "The Brain of an Army," "War and Policy," and "The British Policy in South Africa."

WILKINSON, James, soldier, born at Benedict, Md., in 1757; died Dec. 28, 1825. He studied medicine, but entered the Continental army in 1778 and served in Canada and at Saratoga under Gates. His implication in the Conway Cabal caused him to resign from the service. After the close of the war he emigrated to Kentucky, where he became implicated in an attempt to transfer that region from the United States to Spain. In 1791 he was reinstated in the army for service against the Indians, and five years later succeeded General Wayne as commander in chief. President Jefferson appointed him Governor of Louisiana in 1805 and the following year he disclosed the scheme of Aaron Burr to found an empire in the Southwest. Although implicated in the conspiracy, he was acquitted after being court-martialed. In the War of 1812 he coöperated with General Hampton, but was discharged from the service on account of inability. Soon after he removed to Mexico, where he resided until his death.

WILL, in law, the disposition of a person's property to take effect after death. The term will is more strictly applied to the disposal of real property, while the word *testament* has reference to the disposition of personal property. The words *last will* are usually employed in documents that dispose of real property, while the expression *last will and testament* refer to the disposal of both real and personal property. In order to have testamentary capacity, that is, to be able to dispose of property either by a will or a testament, it is necessary that the person be of full age and sound mind. In most countries this right is vested in females who have reached their majority and in married persons of both sexes, even if they have not reached full age. A will must be in writing, be signed by the testator or some one acting in his presence and by his direction, and be witnessed by two persons who are present at the time and not beneficiaries by the will. The testator may name one or more persons as executors to see that the provisions of the will are carried out, but in the absence of such an appointment the court names the executor.

A *codicil* is an addition to the will. Both the will itself and one or more codicils, to render them inoperative, may be canceled or destroyed by the testator, or a document to revoke the will may be duly executed in the presence of two witnesses, who must sign the same. If several wills are in existence, the one of latest date takes precedence, but, if it is revoked, the one prior is thereby revived. The custodian of a will files the same in the probate court after the death of the testator, where it is admitted to

probate and is afterward duly recorded. In most countries personal property can be disposed of by will verbally in the presence of witnesses, though the value is usually limited to $300.

WILL, in mental science, one of the three faculties of the mind, which include intellect, sensibility, and will. The *will* is the faculty by which we choose and execute, or, as defined by some writers, the power of choice and volition. A completed act of the will embraces the choice of an aim or object and the putting forth of energy to accomplish that aim, or attain that object. Thus, a choice is more than a mere preference between two courses of action. It may be said to constitute the choice of an object to which the activity is to be directed. To what extent the will is free in making a choice has been a subject of controversy for ages. Philosophers in all epochs of learning have discussed the relation between will and motive, but it has never been authoritatively settled whether the will determines the motive or the motive governs the will. On the one hand we have those who maintain a theological and metaphysical belief in the freedom of the will, while others assert that will action is the result of necessity. Aristotle asserted the freedom of the will in his ethics and was supported in that view by the Stoics, the Epicureans, Origen, and Saint Augustine. Many modern writers, among them Kant and Hamilton, have supported the view that the action of the will is unrestrained. The Gnostics denied the freedom of the will, as also did many early Christians, Spinoza, and Hume. That the will can be effectually trained is apparent, its right culture depending upon right use. The training of this faculty depends upon allowing the child to exercise the will within reasonable limits, but the learner is to be held responsible for the consequences attending its free exercise.

WILLAMETTE (wĭl-lă′mĕt), a river in Oregon, which rises in the Calapooia Mountains, a range of the Cascades, and after a general course toward the north enters the Columbia near Portland. It has a total length of 258 miles and is navigable for 150 miles. Canal and locks are maintained to avoid the falls at Oregon City and Eugene. The Willamette valley is the most densely populated part of Oregon. Among the chief tributaries of the Willamette are the Yamhill, Santiam, Calapooia, and McKinzie rivers. Portland, Salem, Albany, Oregon City, and Eugene are the principal towns on the Willamette.

WILLARD (wĭl′lẽrd), **Emma Hart,** educator, born at Berlin, Conn., Feb. 23, 1787; died April 15, 1870. She studied at the academy in her native village, where she became a teacher in the public schools. Three years later she was chosen principal of an academy for girls at Middlebury, Vt., where she married Dr. John Willard in 1809. Soon after she established a boarding school for girls and made it an instrument to promote higher education among women. In 1821 the school was removed to Troy, N. Y., where it was incorporated as the Troy Female Seminary. Later she aided in founding a school for girls at Athens, Greece, and promoted the cause of higher education among women by lecturing and writing. A statue of her was unveiled in Troy, N. Y., in 1895. Her books include "History of United States," "Treatise on the Circulation of the Blood," "Willard Geographies and Atlases," and "Last Leaves of American History." She is the author of the poem "Rocked in the Cradle of the Deep."

WILLARD, Frances Elizabeth, lecturer and reformer, born in Churchville, N. Y., Sept. 28, 1839; died in New York City, Feb. 18, 1898. Her parents removed to Wisconsin and thence to Evanston, Ill., in 1858, where she graduated from the Northwestern University. After teaching in the public schools for several years, she became a teacher in the Northwestern University and from 1868 to 1870 traveled in Europe and the East. She was president of the Woman's College in Evanston from 1871 until 1874, where she first showed her extraordinary ability as an organizer and leader. Besides contributing to a number of magazines and other periodicals, she became known as an effective speaker and for many years her energy seemed to be almost boundless. For ten years she averaged one address daily before a public meeting and spoke in nearly every city of 10,000 or more inhabitants in the United States. While on her tours, she was accompanied by Anna Gordon and not only devoted herself to speaking, but wrote many articles for newspapers and magazines. In 1892 she became editor of the *Union Signal,* the official organ of the Woman's Christian Temperance Union, which she continued to edit until the time of her death. Miss Willard became corresponding secretary of that organization in 1874, president of the National Union in 1879, and chief executive officer of the World's Union in 1888. Her writings include "Glimpses of Fifty Years," "Woman and Temperance," "How to Win," "Nineteen Beautiful Years," "A Great Mother," and "Woman in the Pulpit."



FRANCES E. WILLARD

WILLIAM (wĭl′yạm), Prince of Orange, surnamed *The Silent,* born at the palace of Dillenburg, in Nassau, April 16, 1533; assassinated in Delft, July 10, 1584. He was the eldest son of William, Count of Nassau, who was a zealous Lutheran, but was brought up nominally as a Catholic at Brussels. In 1538 he became a page at the court of Charles V., who favored him on account of his many talents. In 1555 Charles V. transferred the Netherlands to his son, Philip

II., but the reckless persecutions of the Protestants caused William to turn against the Spaniards and in 1567 he retired to Germany. Although he had been brought up a Catholic, he declared himself a Protestant and raised a large army with which to expel the Duke of Alva from the Netherlands. He was forced to retire to French Flanders, where he joined the Huguenots under Coligny. Shortly after he invaded Brabant, organized a large number of privateers to harass the coast, and in 1572 was made stadtholder of Holland, Utrecht, Zealand, and Friesland by the estates, thus obtaining the necessary support to organize a powerful opposition to the Spanish.

The massacre of Saint Bartholomew in France temporarily checked the hopes of William of obtaining material aid from France, but he negotiated a treaty by which the provinces united to expel the Spaniards. The siege of Leyden was one of the important events of that period. The city had been surrounded by the Spaniards until it was almost starved into surrendering, but William saved it by breaking the dikes and letting in the sea to destroy the fortifications built by the Spaniards as defenses against the city. In 1579 he formed the union of Utrecht, by which Holland, Utrecht, Friesland, Zealand, Overyssel, Gronigen, and Gelderland became united, thereby founding the republic of the United Netherlands. These united provinces declared themselves independent on July 26, 1581, and offered to make William the chief ruler, but he twice refused. Philip II. was so thwarted by the military successes of William that he set a price of 25,000 gold crowns upon his head, and the latter was finally assassinated by a Frenchman named Balthasar Gérard. At Dillenburg is a memorial tower, which was erected to his memory in 1875.

WILLIAM I., surnamed *The Conqueror*, King of England and Duke of Normandy, born at Falaise, Normandy, in 1027; died near Rouen, France, Sept. 9, 1087. His father, Duke Robert I. of Normandy, died in 1035 and several claimants contested the throne, but his guardians were able to maintain his rights until he reached manhood. Edward the Confessor, King of England, was his second cousin and the Norman influence at the English court had gained considerable strength during his reign. At the death of the latter, William claimed the throne of England, but the English objected to his pretensions and chose Harold, a Saxon, as king. He soon after invaded England with a powerful army from Normandy and at the Battle of Hastings, on Oct. 14, 1066, totally defeated the English under King Harold, who was slain in battle. His government was mild and considerate at first, but the conquered Saxons rose in open revolt in 1070 to expel the Normans and, after subduing the former, he treated them as a conquered nation.

William established the feudal system by granting large tracts of land to his nobles, garrisoned the fortresses with Normans, and insisted upon firm administration of law and justice. Scotland was invaded by him with a large army in 1072, when Malcolm Canmore, King of Scotland, was required to recognize Norman authority. In the later part of his reign he authorized a general survey of the lands and had records made of the various divisions, which are still found in the *Domesday Book*. In 1080 his son, Robert, commanded an army in an open war against him. William invaded France in 1087 because of the difficulties which arose on account of the King of France encouraging Norman nobles to engage in a rebellion. While in France he left his half-brother, Bishop Odo, to administer the government in England. The army under William the Conqueror captured Nantes and several other points, but he was injured by falling from a horse and died in the abbey of Saint Gervais, near Rouen. He was buried at Caen, in the Church of Saint Stephen, which had been erected by him in 1064.

WILLIAM II., surnamed *Rufus*, King of England, born in Normandy in 1056; died Aug. 2, 1100. He was the second son of William the Conqueror, whom he succeeded as King of England on Sept. 26, 1087. His elder brother, Robert, had rightly inherited the throne, but William hastened to England on hearing of the death of his father and was crowned at Westminster. His brother, then Duke of Normandy, was supported for the throne of England by the Norman barons and accordingly incited an insurrection, but William promptly invaded Normandy. After obtaining recognition as King of England, he expelled the Norman barons and confiscated their estates. Subsequently he invaded Scotland, put down insurrections in Wales, and made numerous internal improvements. He completed the Tower, erected Westminster Hall, and built the London Bridge. In 1091 he crossed into Normandy with an army, but made a conciliation with his brother, Robert, in 1096 by loaning him $50,000 to accompany the Crusade to the Holy Land. As security on this loan he accepted a mortgage on Normandy. William was accidentally shot while hunting in the New Forest by Sir Walter Tyrrel. He was succeeded by his younger brother as Henry I.

WILLIAM III., Stadtholder of Holland and King of England, born in The Hague, Nov. 1, 1650; died in Kensington, March 8, 1702. He was a son of William II. of Nassau, Prince of Orange, and Mary, daughter of Charles I. of England. William was opposed by Cromwell in his rightful title to become stadtholder, and the government of the United Provinces was in the hands of John De Witt for some years. France and England declared war against the Netherlands in 1672, when an open revolt caused De Witt to be murdered, and William was declared captain general and stadtholder of the

United Provinces. When almost overpowered by the larger opposing army, William cut the dikes built by the Hollanders to prevent the sea from flooding their lands, thus compelling the allied armies to retire. The Treaty of Nimeguen finally restored peace in 1678, when Louis XIV. of France withdrew his hostile forces. William had married Mary, daughter of King James II. of England, in 1677, and thus came in position to exercise considerable influence. He curbed the power of Louis XIV. by stimulating the League of Augsburg, in 1686, and on Nov. 5, 1688, invaded England with a powerful army at the invitation of many leading citizens.

The people rallied to his support as soon as he reached the shore at Torbay, while James fled with his family to France, and William and Mary were proclaimed joint sovereigns on Feb. 13, 1689. Scotland almost immediately accepted the new conditions, but Ireland, being aided by an army under James, maintained the cause of the deposed king. However, their forces met defeat at Boyne in 1690 and at Aughrim in 1691, and they were finally compelled to submit. William next invaded France to punish Louis XIV., who had been championing the cause of James, but his army was defeated in a number of decisive battles and he was compelled to accept the Treaty of Ryswick, in 1697. Louis XIV. recognized William as King of England on the death of James, in 1701. William is classed among the ablest kings of England. Within the period of his reign material progress was made in the educational and industrial welfare of the people. He died from the effects of falling from his horse at the time when the War of the Spanish Succession was about to begin. William was courageous and persevering in business, liberal in theological opinions, and thoughtful in the administration of law.

WILLIAM IV., King of England and Ireland, born in London, Aug. 21, 1765; died June 20, 1837. He was the third son of George III., became a midshipman under Admiral Digby in 1779, and was made Duke of Clarence in 1789. On the death of the Duke of York, in 1827, he became heir apparent, and on June 26, 1830, succeeded his brother, George IV., to the throne. The events of his reign include the abolition of slavery in the colonies, the passage of the Reform Act, the reform of the poor laws, and extensive internal improvements. William married Adelaide of Saxe-Meiningen in 1818, but left no surviving children. He was succeeded by his niece, Queen Victoria, who was the daughter of Edward, Duke of Kent, fourth son of George III.

WILLIAM I., King of Prussia and Emperor of Germany, born in Berlin, March 22, 1797; died March 9, 1888. He was the second son of Frederick William III. of Prussia and was carefully educated. His training in military affairs was the most efficient obtainable in his time, thus equipping him for the celebrated military and political successes that make his name famous in history. In 1813 he became a captain and accompanied Blücher in his campaigns against Napoleon from 1813 to 1815. The Iron Cross was awarded him for distinguished services at Bar-sur-Aude. He was made major general in 1818, studied the military systems of several European countries, and in 1829 married Princess Augusta of Saxe-Weimar. His brother, Frederick William IV., ascended the throne of Prussia in 1840, thus making William the heir apparent, and the latter commanded the forces that suppressed the revolution of 1849 in Baden. In 1858 he became regent, owing to the illness of his brother, and on Jan. 2, 1861, succeeded the latter on the throne of Prussia. He won great popularity by his success in building a sentiment of fellowship among the German states and by his eminent military achievements.



WILLIAM I.

In 1864 William added the duchies of Schleswig and Holstein to Prussia by a successful war against Denmark, and in 1866 his military forces subdued those of Austria, ending in the famous victory of Sadowa. When Napoleon III. declared war against Prussia, in 1870, all the north German states rallied to his standard, and he personally accompanied his well-disciplined armies on the invasion of France. At the battles of Sedan and Gravelotte he had personal command, and afterward entered Paris at the head of the army. On Jan. 18, 1871, he was proclaimed Emperor of Germany in the palace of Versailles and was greeted with unbounded enthusiasm on his return to Berlin. His reign of 31 years witnessed remarkable industrial and commercial development in the German states. The success of his political and military career may be attributed to his calm judgment and his unsurpassed wisdom in choosing generals and statesmen to coöperate with him. Von Moltke is the greatest soldier of his time and Bismarck, the most eminent statesman. He was succeeded by his son, Frederick III. Many monuments have been erected to his memory. His moderation and calm statesmanship may be considered prominent factors in the success of modern Germany, both in its military and industrial development.

WILLIAM II., King of Prussia and Emperor of Germany, eldest son of Emperor Frederick III., born in Berlin, Jan. 27, 1859. After studying under private tutors at home, he entered the gymnasium of Cassel. Subsequent to graduating from that establishment, in 1877, he became a student in the University of Bonn. He married Princess Augusta Victoria of Schleswig-Holstein, Feb. 27, 1881, and on June 15, 1888, succeeded his father as emperor. Before the death of his father he expressed opposition to the peaceful policy inaugurated by the latter and it was thought that his reign would be of a pronounced military character, but on ascending the throne he issued addresses of a pacific tone, in which he expressed the determination to maintain the existing peace and promote the national welfare. His first act of public policy was to visit the various courts of Europe to cement friendly relations. While on a visit to England, in 1893, he won the Queen's cup at the Cowes yacht race. His determination to be ruler in fact as well as in name caused Prince Bismarck to resign as chancellor of the empire in 1890. Other events of importance include the acquisition of Helgoland, the extension of colonial interests in Africa and the Pacific, the renewal of the Triple Alliance, and legislation favorable to the laboring and agricultural classes. He demonstrated a large interest in the dissemination of education, especially in the primary and elementary lines, and became noted as a patron of science. The policy pursued by his government materially widened the importance of Germany as a manufacturing and exporting country, two lines in which it occupied a high rank among the nations. He was prominent throughout the Great European War and at its close, in 1918, he abdicated and withdrew to Holland. His son, Frederick William, the crown prince, born in 1882, had an important command in the campaigns against France.



WILLIAM II.

WILLIAM AND MARY COLLEGE, an institution of higher learning at Williamsburg, Va., founded in 1693. It is the second oldest institution of its kind in the United States. During the Revolution it suffered heavily through the loss of its endowments and much of its property was destroyed at the time of the Civil War, when the buildings were occupied by the Federal troops. It was again opened in 1869, but suspended instruction from 1881 until 1888, owing to a lack of financial support. In 1893 Congress granted it an indemnity of $64,000 for its losses during the Civil War, and in the meantime it received additional aid from the State. The courses include general normal and collegiate instruction. It has a library of 10,000 volumes, the property is valued at $160,000, and it is attended by about 200 students. Among the eminent graduates are John Marshall, Winfield Scott, and Presidents Harrison, Jefferson, Monroe, and Tyler.

WILLIAMS, John, celebrated missionary, born at Tottenham, England, June 29, 1796; died in the New Hebrides, Nov. 20, 1839. He was apprenticed to an ironmonger in 1810 and acquired considerable skill as a mechanic, but subsequently became interested in missionary work. The London Missionary Society sent him to the South Sea Islands in 1816, with a station in the Society Islands, where he learned the native language and did extensive work in inducing the people to embrace Christianity and engage in civil arts. He visited many other islands and trained natives to do missionary work. In 1834 he returned to England, where he had the New Testament printed in the Raratongan language, and four years later returned to his missionary work in the Society Islands and Australia. While at Erromango, in the New Hebrides, he was assassinated by the natives.

WILLIAMS, John Sharp, public man, born at Memphis, Tenn., July 30, 1854. He studied at the University of the South, the University of Virginia, and in Heidelberg, Germany, and began to practice law in 1877. The following year he removed to Yazoo City, Miss., where he built up a successful law practice. In the meantime he became interested as a cotton planter. In 1892 he attended the Democratic national convention as a delegate, after which time he was a factor in other national conventions of that party. He was elected to Congress in 1892 and was reëlected from time to time. He served on many important committees in the House, where he was the leader of his party for many years.

WILLIAMS, Roger, noted Puritan clergyman and founder of the colony of Rhode Island, born in London in 1604; died in Rhode Island in 1683. He graduated from Cambridge University and studied law, but later became a clergyman in the Anglican Church. Subsequently he joined the Puritans and in 1631 came to Massachusetts, where he was pastor in Plymouth and Salem. His pronounced views in favor of religious toleration and that the government and church should be separated caused him to be expelled from the colony. In 1636 he left Salem and in the same year founded Providence and established friendly relations with the Indians. The settlement was so named in remembrance "of God's providence to him in distress." He was publicly immersed in 1639 and became pastor of the First Baptist Church of Providence. Mas-

sachusetts began to claim jurisdiction over Narragansett Bay, hence Williams proceeded to England, in 1643, where he obtained an independent charter, and in 1649 was chosen deputy president. He made a second visit to England in 1651 in behalf of the settlers, and while there enlisted the friendship of Milton, Cromwell, and other prominent leaders of the Puritans. On returning to the colony, in 1654, he became its governor and served in that office until 1658. The religious freedom enjoyed in Rhode Island was due to him. He published "The Bloody Tenet of Persecution for Cause of Conscience," "Experiments of Spiritual Life and Health," and "Hireling Ministry None of Christ's."

WILLIAMS, Samuel Wells, historian and lecturer, born in Utica, N. Y., Sept. 22, 1812; died in New Haven, Conn., Feb. 16, 1884. He graduated at the Rensselaer Polytechnic Institute in 1832 and the following year went to China as a printer in the service of the American Board of Foreign Missions. For several years he assisted in editing the *Chinese Repository.* From 1853 to 1854 he was interpreter to Commodore Perry on his expedition to open Japan to the trade of the world. In 1862 he became secretary and interpreter to the United States legation in China, but returned to the United States in 1875 to accept a lectureship on Chinese literature and language in Yale University. He was president of the American Bible Society in 1881. His writings include "Chinese Commercial Guide," "Dictionary of the Chinese Language in the Canton Dialect," "History of the Middle Kingdom," and "Easy Lessons in Chinese." He translated the books of Matthew and Genesis into Japanese.

WILLIAMSBURG (wĭl'yąmz-bûrg), a city in Virginia, county seat of James City County, on the James River, 48 miles southeast of Richmond. It is on the Chesapeake and Ohio Railroad. The features include the county courthouse, the Powder Horn building, the Bruton Parish Church, the Eastern State Hospital for the Insane, and the William and Mary College. It has manufactures of knit goods, brick, machinery, and lumber products. Fish, oysters, fruit, and farm produce are shipped from this place. It was settled in 1632 and became the capital of Virginia in 1698, supplanting Jamestown as the seat of government. Williamsburg was the scene of several battles in the Revolution and the Civil War. The Battle of Williamsburg, fought on May 6, 1862, was an engagement of the Peninsular Campaign, in which the Union army under Hooker was defeated by the Confederates under command of Longstreet and Magruder, the former losing 2,285 men and the latter 1,560. Jefferson, Randolph, Tyler, Monroe, Winfield Scott and Chief Justice Marshall are among the famous men who studied at Williamsburg. It was the Colonial and State capital until 1780. Population, 1920, 2,462.

WILLIAMS COLLEGE, an institution of higher learning at Williamstown, Mass., founded by charter in 1793. It is the outgrowth of a school established under the will of Ephraim Williams (1715-1755), an American soldier and pioneer. Mark Hopkins was its president from 1836 until 1872, under whose supervision it developed a high standing among the institutions of America. Students are admitted upon examinations or certifictes from accredited schools, and the courses lead up to the degrees of B. A. and M. A. It has property valued at $450,000, an endowment of $1,250,000, and a library of 85,000 volumes and pamphlets. The faculty consists of 60 instructors and it has an attendance of 450 students.

WILLIAMSPORT (wĭl'yąmz-pōrt), a city in Pennsylvania, county seat of Lycoming County, on the Susquehanna River, 93 miles north by west of Harrisburg. It is on the Erie, the Pennsylvania, the Philadelphia and Reading, and other railroads. The surrounding country is a rich farming and coal-producing region. It has a large trade in coal, lumber, and merchandise. The streets are regularly platted and finely improved by pavements, gas and electric lighting, electric street railways, waterworks, and several parks. Among the chief buildings are the county courthouse, the city hall, the Federal post office, the Masonic Temple, the Dickinson Seminary, and the Scottish Rite Cathedral. The manufactures include lumber products, clothing, boilers, cigars, rubber goods, sewing machines, furniture, and machinery. It was first settled in 1795 and was chartered as a city in 1866. Population, 1900, 28,757; in 1920, 36,198

WILLIAMSTOWN, a town of Massachusetts, in Berkshire County, on the Hoosac and Green rivers, 22 miles north of Pittsfield. It is on the Boston and Maine Railroad and has communication by electric railways. The leading features include the Mission Park, the public library, and the Williams College. It is primarily a residential center, but has manufactures of boots and shoes, woolen goods, hardware, clothing, and carriages. Williamstown was settled in 1753 and called West Hoosac, but the present name was adopted in 1765 in honor of Ephraim Williams. Population, 1920, 3,707.

WILLIMANTIC (wĭl-lĭ-măn'tĭk), a city of Connecticut, in Windham County, on the Natchaug and Willimantic rivers, 30 miles east of Hartford. It is on the Vermont Central and the New York, New Haven and Hartford railroads. The Willimantic River has a fall of 100 feet in one mile, thus supplying an abundance of water power. The noteworthy buildings include the public library, the townhall, the Dunham Hall Library, and the State normal training school. Among the manufactures are cotton and silk textiles, woolens, linen thread, carriages, machinery, and farming implements. It has a growing trade in merchandise. The

place was settled in 1822, became a borough in 1833, and was incorporated as a city in 1893. Population, 1900, 8,937; in 1920, 12,330.

WILLIS (wĭl'lĭs), **Nathaniel Parker,** author, born in Portland, Me., Jan. 20, 1806; died July 20, 1867. He was the eldest son of Nathaniel Willis, a newspaper proprietor in Boston, and studied at the Andover Academy and Yale University, graduating from the latter in 1827. About that time he published "Poetical Sketches" and in 1829 founded the *American Monthly Magazine,* which was afterward merged with the New York *Mirror.* His most charming work is "Letters From Under a Bridge," published in 1840. Other well-known writings include "Inklings of Adventure," "Pencilings by the Way," "Dashes at Life," "Life Here and There," "People I Have Met," "Rambles and Adventures," "Famous Persons and Places," "Ghost Ball at Congress Hall," "Outdoors at Idlewild," "A Health Trip to the Tropics," and "A Life of Jenny Lind."

WILLISTON, county seat of Williams County, N. D., 115 miles west of Minot, on the Missouri River and on the Great Northern Railroad. It has a large trade in flour, lignite coal, and farm produce. The local and wholesale trade is extensive. Among the chief buildings are the courthouse, high school, and federal building. It was settled in 1870 and incorporated in 1903. Population, 1920, 4,178.

WILLOW, a class of shrubs or trees of the genus *Salix,* varying in size from shrubs of only a few inches in height to trees 40 to 75 feet high.



WEEPING WILLOW.

They usually grow by or near water courses and are confined almost entirely to the temperate and colder regions of the Northern Hemisphere. Many species have been described. The branches of most species are smooth and the branchlets are usually long, slender and pliant. Most species have numerous long roots which penetrate into the moist soil and by a network of fibers supply protection against the water of streams wearing away the banks. The slender and pliant branchlets of some species have been utilized from the earliest time for basket work and in the early history of Europe were twisted into ropes. This class of willows is known as *osier* and includes the two kinds generally called *velvet osier* and *purple osier.* The leaves of some species are used for fodder, some furnish excellent timber and valuable wood for gunpowder charcoal, and others yield bark which is rich in tannin.

Fully 160 different species of willows have been catalogued, of which 35 are native to North America. Most of the American species yield a wood which is too soft for construction purposes, but it possesses value for charcoal and fuel. It is employed in making furniture, baskets, and various household utensils. The *white willow* is especially valuable for making charcoal for gunpowder. It is planted in many places for its wood and for protection of other trees against winds, its rapid growth making it of particular value for that purpose. The *weeping willow* is a fine ornamental tree native to Asia and has been introduced in many parks and cemeteries of America. The branchlets of this species are remarkable for their drooping habit, thus making a large tree very attractive. It has long been considered as symbolical of mourning. The *salix regalis* is greatly admired for its white, silvery leaves.



WILLOW BASKET.

WILMINGTON (wĭl'mĭng-tŭn), a city of Delaware, county seat of Newcastle County, 28 miles southwest of Philadelphia, Pa. It is situated on the Delaware River and on the Baltimore and Ohio, the Philadelphia, Baltimore and Washington, and the Wilmington and Northern railroads. The harbor is sufficiently deep for the landing of large steamers and lines are maintained with many commercial centers, both for the conveyance of freight and passengers. Intercommunication is by electric railways, which extend to many inland points. The site is on elevated ground, overlooking the Delaware, which is about three miles wide at this point, and within the city is the junction of Christiana and Brandywine creeks. The streets are platted regularly, crossing each other at right angles. They are improved and beautified by parkings, pavements, and gas and electric lighting.

Among the chief buildings are the county courthouse, the post office, the public library, the customhouse, the auditorium, and the Equity Guarantee and Trust Company's building. The Holy Trinity Church, built by the Swedes in 1698, is one of the oldest ecclesiastical structures in the United States. The public schools are well organized. It has many fine hospitals and charitable institutions, such as the State Hospital for the Insane and the Home for Friendless and Destitute Children. It is the seat of the Wesleyan Female College, the Delaware Institution, the Rugby Academy for Boys, the Delaware Industrial School for Girls, and the State Normal University.

Wilmington is important as a commercial and manufacturing center. Much water power for industrial enterprises is obtained from the Falls of the Brandywine. It has large interests in shipbuilding, the construction of railway cars and machinery, the manufacture of paper, and the production of morocco leather. About four miles from the city is a large powder factory. The general manufactures include clothing, machinery, leather, saddlery, hardware, and pottery. It is the center of a large trade in merchandise, fruits, and general manufactures.

The site of Wilmington was first settled by the Swedes under Peter Minuet in 1838 and the locality was named Fort Christina. Later the village became known as Christinaham. The Dutch under Peter Stuyvesant bought the region from the Indians in 1655 and Fort Christina was taken by them the same year. Nine years later the place was captured by the English, after which it was added to the proprietary possessions of William Penn. Thomas Willing platted a town in 1737, which became known as Willingstown, but eight years later the name was changed to Wilmington. Chad's Ford, about twelve miles distant, was the scene of the Battle of Brandywine. Population, 1920, 110,168.

WILMINGTON, the largest city in North Carolina, county seat of New Hanover County, on the Cape Fear River, eighteen miles from the sea. It is on the Atlantic Coast Line, the Seaboard Air Line, and other railroads. The harbor is well improved and has steamboat connections with the principal ports on the Atlantic. Among the noteworthy buildings are the county courthouse, the United States government building and marine hospital, the city hall, the public library, the Cape Fear Academy, the Masonic Temple, the Y. M. C. A. building, and the county and city hospitals. The manufactures include carpets, turpentine, creosote, cotton and woolen goods, cotton-seed oil, hardware, lumber products, and machinery. The exports consist chiefly of turpentine, cotton, rosin, and lumber. Gas and electric lighting, waterworks, storm drainage, and electric street railways are among the general facilities. Formerly the site was occupied by Newton, a town founded in 1730, but the name was changed to Wilmington in 1739. The place was incorporated as a city in 1866. It was the chief port of entry for the Confederates in the Civil War. Population, 1920, 33,373.

WILMOT (wĭl′mŏt), **David,** jurist and statesman, born in Bethany, Pa., Jan. 20, 1814; died March 16, 1868. After studying in his native city and at Aurora, N. Y., he pursued a course in law and in 1834 was admitted to the Pennsylvania bar. He was elected to Congress as a Democrat in 1844, serving until 1851, and was a member of the United States Senate from 1861 to 1863. In the latter year he was appointed judge of the United States court of claims. Wilmot is best known as the author of the *Wilmot Proviso*, a measure introduced by him in 1846, which provided that neither slavery nor involuntary servitude shall ever exist in any part of the territory purchased from Texas, except for crime. It was in the form of an amendment to a bill appropriating $2,000,000 for the purchase of a part of the territory secured by the annexation of Texas, and, though passing the House in amended form, it failed in the Senate. The Wilmot Proviso was brought up and debated for a number of years whenever new territories were to be organized, as in the case of California, Oregon, Utah, and New Mexico. The doctrine embodied in it was finally established by Congress in 1861, when an act was passed prohibiting slavery "in any territory of the United States now existing, or which may be hereafter formed or acquired." Wilmot was judge of the United States court of claims from 1863 until his death.

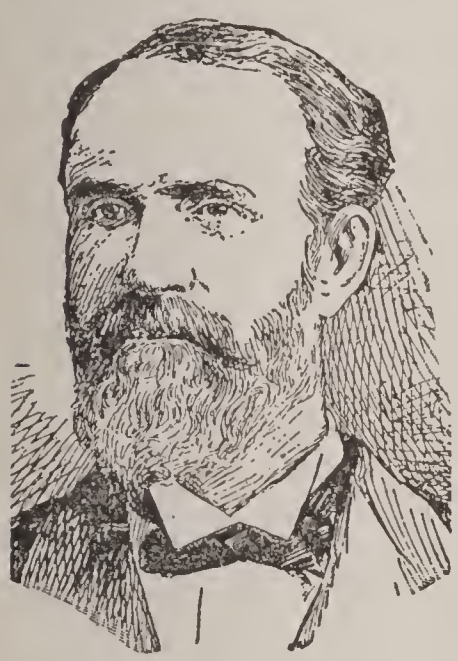
WILMOT PROVISO. See **Wilmot, David.**

WILSON, Alexander, American naturalist, born in Paisley, Scotland, July 6, 1766; died in Philadelphia, Pa., Aug. 23, 1813. His father was a weaver. He worked at the weaving trade for some years, but afterwards became a peddler. In the meantime he wrote a number of poems and published a small volume of collected poems. He came to the United States in 1794 and peddled a number of years in Delaware and New Jersey. While thus engaged he studied bird life, made a collection of American birds, and in 1804 visited Niagara Falls and western New York. Later he made a tour of the Southern States and was accompanied in some of his journeys by George Ord. His chief writing is "American Ornithology," a valuable work in seven volumes. It was not wholly completed at the time of his death, but an addition to it was made by George Ord, and it was further enlarged by Lucien Bonaparte.

WILSON, Henry, statesman, born in Farmington, N. H., Feb. 16, 1812; died in Washington, D. C., Nov. 22, 1875. He was the son of a day laborer and at the age of ten years became employed on a farm. Greatly interested in reading and study, he spent his leisure time in that way. It is said that he read about a thousand volumes of useful books before he reached the age of 21 years. His name originally was Jeremiah J. Colbath, but in 1833 he changed it for some unstated reason to Henry Wilson. Subsequently he learned the trade of a shoemaker at Natick, Mass., and at the same time pursued a course in the Concord Academy. In 1840 he became noted as a public speaker in support of Harrison for the Presidency and served as a Whig in the State Legislature for ten years, but afterward denounced that party and joined the Free Soilers. He was the candidate of the Free Soil party for Governor in 1853, but was defeated. In 1855 he became a member of the United States Senate as a Unio

candidate, and went over to the Republican party when that organization was formed. He served as chairman on the Committee of Military Affairs during the war and ranked as one of the chief opponents of slavery. In 1872 he was elected Vice President on the ticket with President Grant. He died before the expiration of his term. Wilson wrote "Military Measures in Congress," "Anti-Slavery Measures in Congress," "Rise and Fall of the Slave Power in America," "A Contribution to History," and "Obituary Addresses." The last mentioned is a collection of speeches delivered by him in Congress.

WILSON, James, agriculturist, born in Ayrshire, Scotland, Aug. 16, 1835. In 1852 he came with his parents to America and settled with them in Connecticut, where he received an academic education. He removed to Tama, Iowa, in 1855, giving his attention to practical and scientific farming. In 1872 he was elected to Congress as a Republican, serving in that body for six years. He was regent of the Iowa State University from 1870 to 1874 and subsequently served for six years as professor of agriculture and director of the agricultural experiment station at the Iowa College of Agriculture and Mechanic Arts, Ames. In 1897 he was appointed Secretary of Agriculture in the Cabinet of President McKinley, in which position he was retained by President Roosevelt and by President Taft. Wilson was not only an efficient officer, but materially aided in disseminating knowledge in agricultural arts. He contributed many able articles to magazines. He died Aug. 26, 1920.



JAMES WILSON.

WILSON, James, jurist, born near Saint Andrews, Scotland, in 1742; died Aug. 28, 1798. He studied at the universities of Glasgow and Edinburgh and in 1766 emigrated to Pennsylvania. For some time he was tutor in the University of Pennsylvania and afterward practiced law at Reading, Pa., and at Annapolis, Md. In 1775 he was made a member of Continental Congress, where he advocated the American cause with much earnestness, and was a signer of the Declaration of Independence. In 1787 he was a member of the committee which drafted the Federal Constitution and later took part in the Pennsylvania convention which ratified that document. He was made one of the judges of the Supreme Court in 1889 Bird Wilson, his son, published an addition of his speeches and lectures.

WILSON, James Grant, American author, born in New York City, April 28, 1832; died Feb. 1, 1914. He studied at College Hill, Poughkeepsie, N. Y., and later joined his father in the book business at Chicago. At the beginning of the Civil War he was commissioned major, served in a number of important battles under Banks and Grant, and in 1865 was promoted brigadier general. He settled in New York City after the close of the war and devoted himself to a literary career. In 1884 he became president of the New York Genealogical and Biographical Society. He published "Sketches of Illustrious Soldiers," "Memorial History of the City of New York," "Poets and Poetry of Scotland," "World's Largest Libraries," "Bryant and His Friends," and "Life of James Bayard." He edited *Appleton's Cyclopaedia of American Biography.*

WILSON, James Harrison, soldier, born at Shawneetown, Ill., Sept. 2, 1837. After graduating at West Point Military Academy, in 1860, he was assigned to the corps of topographical engineers. He was aid-de-camp to General McClellan in the Maryland campaign, served as inspector general of the army of the Tennessee at Vicksburg, and was brevetted major general of volunteers in 1864, for "gallant and meritorious services" during the war. In 1865 he took part in the battles of Franklin and Nashville and the same year conducted a cavalry expedition into Alabama and Georgia, capturing Selma and Montgomery, Ala., and Columbus and Macon, Ga. He was major general of United States volunteers in the war against Spain, taking part in the occupation of Cuba and the Porto Rican campaign, and subsequently joined the China relief expedition. In conjunction with American and British troops he did much to secure control of the entrance to Peking. In 1901 he was placed on the retired list. He published "Life of General U. S. Grant," "Life of Andrew Alexander," and "Life and Services of Major General Alexander McCook." He joined Charles A. Dana in publishing "China: Travels and Investigations of the Middle Kingdom."

WILSON, John, author, best known in literature as *Christopher North,* born in Paisley, Scotland, May 19, 1785; died April 3, 1854. He first studied under a private tutor and afterward at Glasgow University and Oxford, graduating from the latter institution in 1807. In 1811 he married Jane Penny, a lady of Liverpool, and soon after published his first volume of poems, entitled "Isle of Palms." Later he settled on an estate near Windermere, where he formed a warm friendship with Coleridge, Wordsworth, DeQuincey, and Southey. When *Blackwood's Magazine* was established, in 1817, he became one of its chief contributors. In 1820 he was

elected to the professorship of moral philosophy in Edinburgh University, which position he filled successfully till 1851, when he resigned on account of failing health. A penson of $1,500 per year was conferred upon him after retiring from the professorship. Wilson ranks among the most noted Scottish authors and his works are read with as much interest as those of Scott and Burns. Most of his productions were published as magazine articles, but, besides these, he published "City of the Plague," a poem, "Trials of Margaret Lindsay," "Lights and Shadows of Scottish Life," "Recreations of Christopher North," "An Essay on the Genius and Character of Burns," and "The Foresters."

WILSON, John, missionary, born at Lauder, Scotland, Dec. 11, 1804; died June 8, 1881. He studied at the University of Edinburgh and in 1828 began missionary work at Bombay, India. In 1843 he took up the mission work of the Free Church of Scotland. His work is important in that he exercised a wide and powerful influence upon the educational and social affairs of the native Indians. For some time he was vice chancellor of the University of Bombay. His numerous writings include "The Lands of the Bible," "An Exposure of the Hindu Religion," "India Three Thousand Years Ago," "The Parsi Religion," and "The Evangelization of India."

WILSON, John Moulder, soldier and engineer, born in the District of Columbia, Oct. 8, 1837. He graduated at West Point in 1860 and the following year entered the Union service as a military engineer. In 1863 he was made captain of engineers and later was promoted to the rank of colonel for gallantry in various battles. He died Feb. 1, 1919.

WILSON, William Bauchop, public man, born at Blantyre, Scotland, in 1862. He came to the United States in 1870, worked in the coal mines of Iowa and Pennsylvania, and served eight years as secretary of the United Mine Workers of America. In 1906 he was elected to Congress and was twice reëlected. He entered the Cabinet of President Wilson in 1913 as Secretary of Labor.

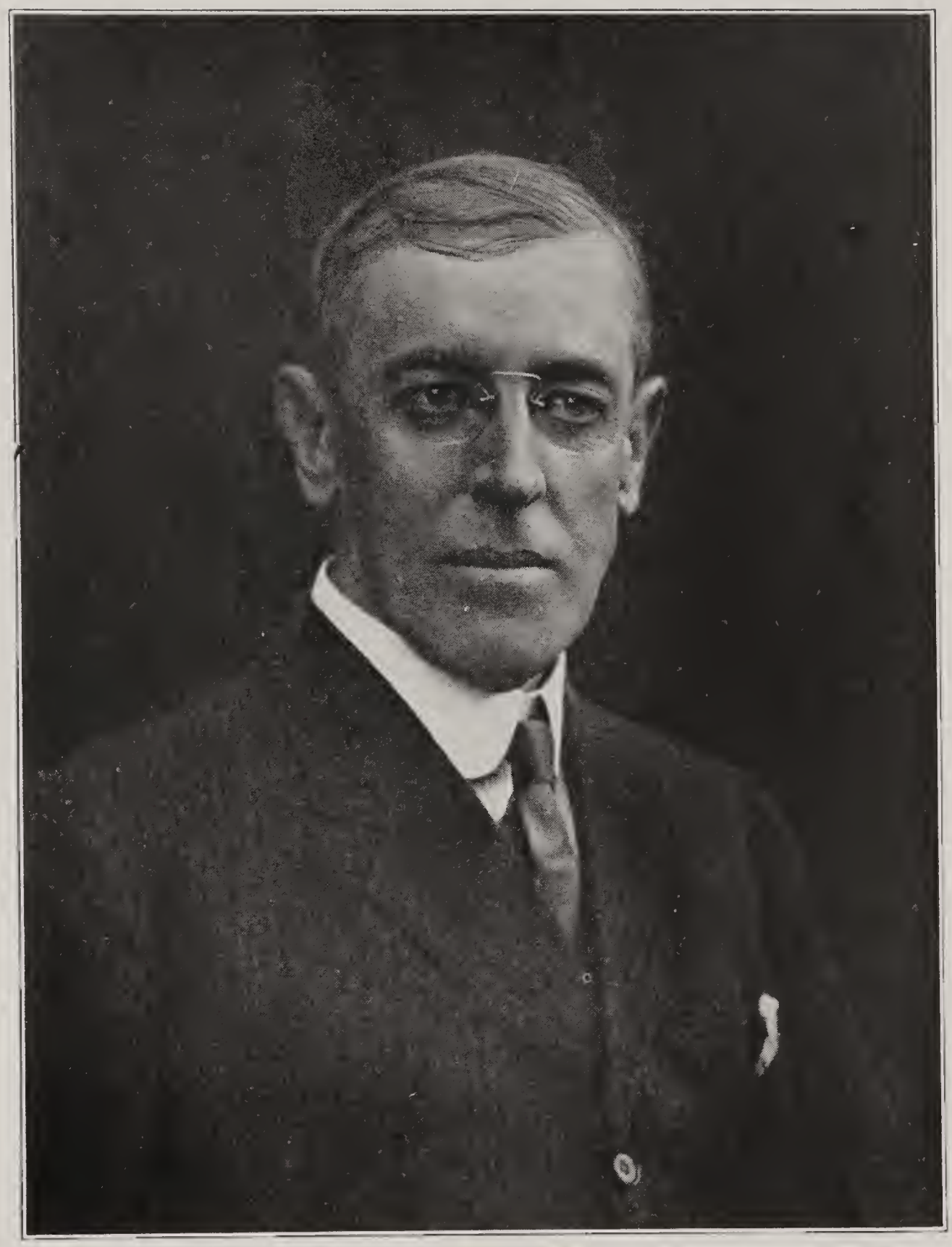
WILSON, William Lyne, statesman, born in Jefferson County, Virginia, May 3, 1843; died Oct. 16, 1900. After studying at Charlestown Academy he entered the Columbian College, D. C., and afterward graduated from the University of Virginia. He served in the Confederate army during the war, held a professorship in Columbian College, and later practiced law at Charlestown, W. Va. Subsequently he again undertook educational work by accepting the presidency of the University of West Virginia. In 1882 he was elected to Congress as a Democrat serving in that body as an influential member six consecutive terms. He became prominent as an orator and writer, and was a pronounced advocate of civil service reform and tariff revision. In the 53d Congress he was the leader of the Democratic majority, officiated as chairman on the Committee on Ways and Means, and as such introduced the Wilson Tariff Bill. He was defeated for reëlection in 1894, but was appointed by President Cleveland as Postmaster General to succeed William S. Bissell.

WILSON, Woodrow, educator and statesman, born at Staunton, Va., Sept. 28, 1856. He graduated at Princeton University in 1879, studied law at the University of Virginia, and later attended Johns Hopkins University. From 1885 to 1886 he was an associate professor of history at Bryn Mawr College, where he held positions until 1888, when he became professor of history at Wesleyan University. He was made professor of jurisprudence and politics at Princeton University in 1890, where he had great success as a teacher, and in 1902 was chosen president of that institution. He served efficiently until 1910, when he was elected governor of New Jersey, from which office he resigned in 1913.

In 1912 Wilson was the nominee of the Democrat party for President and was elected, carrying 42 states and receiving 454 electoral votes, the largest number ever given to any candidate for that office. He announced his intention to carry out the pledges of his party and called an extra session of Congress in April, 1913, to revise the tariff. Other events of his administration include the recognition of the Chinese Republic, the Income Tax Law, the adoption of the Amendment providing for the election of United States senators by direct vote of the people, the enactment of alien land laws, the establishment of the Federal Reserve banks, the revolution in Mexico, and the war in Europe. In 1916 he was again nominated for President by his party and was re-elected, defeating Charles E. Hughes, the Republican nominee. America became a participant in the war in Europe in 1917, after which he devoted his attention to the organization of the country for war on a large scale. In 1919 he was chairman of the American Commission to the Paris Peace Congress. He published "A History of the American People," "The State: Elements of Historical and Practical Politics," "Congressional Government," "Division and Reunion" and "Life of George Washington."

WINCHELL (wĭn'chĕl), **Alexander,** geologist, born in Northeast, N. Y., Dec. 31, 1824; died in Ann Arbor, Mich., Feb. 19, 1891. His many writings include "Geology of the Stars," "Sketches of Creation," "Geological Studies," "Doctrine of Evolution" and "Grand Traverse Region."

WINCHENDON (wĭn'chĕn-dŭn), a town of Massachusetts, in Worcester County, 68 miles northwest of Boston. It is on the Boston and Albany and the Boston and Maine railroads and is surrounded by a fertile region. The manufactures include cotton and woolen goods, machinery, hardware, and clothing. Among the chief buildings are the high school, the public



WOODROW WILSON

(Opp. 3158.)

library, an orphanage, and several fine churches. The region was first settled in 1752, and the town was incorporated under its present name in 1764. Population, 1920, 5,904.

WINCHESTER (wĭn'chĕs-tĕr), a city of Kentucky, county seat of Clark County, eighteen miles southeast of Lexington, on the Louisville and Nashville and the Chesapeake and Ohio railroads. It is situated in the famous Blue Grass region. The principal buildings include the county courthouse, the high school, and the Kentucky Wesleyan College. Among the manufactures are flour, tobacco products, carriages, and farming machinery. The streets are improved by electric lighting, grading, waterworks, and drainage. The trade in live stock, cereals, and lumber is important. It was incorporated in 1792. Population, 1920, 7,866.

WINCHESTER, a town of Massachusetts, in Middlesex County, seven miles northwest of Boston, on the Baltimore and Maine Railroad. It is popular as a residential center for Boston business men. Middlesex Falls, a large State park, is partly within the town. Other features include the public library, the State Aviary, and the home for the aged. It has manufactures of leather, felt goods, machinery, and earthenware. Originally the place was known as Waterfield, but it has been called Winchester since 1850. Population, 1905, 8,236; in 1920, 10,391.

WINCHESTER, a city of Virginia, county seat of Frederick County, 148 miles northwest of Richmond, on the Cumberland Valley and the Baltimore and Ohio railroads. It is surrounded by a fertile farming and stock-growing country and has a growing trade in fruits and merchandise. The manufactures include shoes, furniture, clothing, machinery, and ironware. It has the county courthouse, a public library, the Valley Female College, the Fairfax Hall, the Shenandoah Valley Academy, and Confederate and Federal cemeteries. Winchester was the scene of a number of important events in the Civil War. It was at Winchester that Sheridan heard of the battle at Cedar Creek and started from the vicinity on his famous ride to save the day. It was chartered as a city in 1874. Population, 1900, 5,161; in 1920, 5,864.

WINCKELMANN (vĭn'kĕl-män), **Johann Joachim**, noted archaeologist, born in Stendal, Germany, Dec. 9, 1717; died June 8, 1768. His father was a shoemaker and he pursued his school work under adverse circumstances. Later he studied at Berlin, Halle, and Jena, making a specialty of literature and ancient languages. Subsequently he taught several years at Seehausen, was librarian at Nöthnitz, and afterward visited Rome. Later he traveled in Southern Europe, where he gathered many valuable antiquities. Maria Theresa presented him with some rare coins while he was in Vienna, but he was afterward murdered for them by a thief at Trieste. Writers regard him the founder of scientific archaeology. He published "History of Ancient Skill," "Thoughts on the Imitation of Greek Works in Painting and Sculpture," and "Trial of an Allegory."

WIND, a current of air moving in the atmosphere, which is caused by variations of temperature in different latitudes, or in various portions of the same latitude. When all parts of a layer of atmosphere are equally dense, a calm extends over the region, but as soon as different parts of the layer become of an unequal temperature there is a more or less perceptible movement of air. This is caused by the sun heating the surface of the earth more easily in some parts than in others, thus causing the air above the more heated parts to expand and become lighter, which is then pressed upward by the colder air that rushes in from all sides to take the place of the ascending current. The ascending currents gradually become deflected and form upper currents from the heated surface, but later settle down near the surface to replace the air that has moved in lateral surface currents toward the heated area. A circulatory motion continues in the air as long as the heated area remains warmer than the surrounding regions.

Sea breezes are caused in the same way. The surface of the land becoming more highly heated than that of the water, owing to the fact that the sun's rays penetrate more deeply into the water, an ascending current rises over the land and a breeze sets in from the sea every afternoon. At night the land becomes cooled more rapidly than the water, hence the ascending current then rises from the water and a *land breeze* sets in from the land sometime after midnight. Since the strength of these winds depends upon the difference of the temperature of the land and the water, they are best defined in the tropical and intertropical regions, though they occur in many of the higher latitudes during the hotter part of the year. Currents of electricity and the condensation of aqueous vapors rising from the surfaces of rivers and seas have a more or less noticeable effect upon the air, though the chief cause of winds is the unequal distribution of heat. The anemometer is an instrument to measure the force and velocity of winds. Winds have a relatively vast difference in the force and velocity. A wind blowing at the rate of 100 miles an hour has a pressure of 50 pounds to the square foot, a force sufficient to move loose objects along the surface of the earth. On the other hand, a breeze of 20 miles has two pounds of pressure to the square foot and a light wind moving at the rate of five miles has only two ounces.

Winds are named after the direction from which they blow, as an *east wind*, a *northeast wind*, a *north wind*, etc. They are also designated as *constant*, or those whose direction remains the same throughout the year; *periodical*,

or those which blow alternately in opposite directions for regular periods; and *variable,* or those which blow in any direction. *Equatorial currents* blow as upper currents from the Equator toward the poles and move in a direction opposite to the surface wind, while *polar currents* are lateral surface currents that flow from the poles to the Equator. The earth rotating upon its axis from west to east, there is a constant tendency to deflect the direction of the winds from a straight line drawn between the Equator and the poles. Thus the polar currents, when unaffected by local disturbances, blow from the southeast in the Southern Hemisphere and from the northeast in the Northern, while at the Equator their direction is nearly due east. The equatorial currents blow from the northwest in the Southern Hemisphere and from the southwest in the Northern, but it must be observed that the lateral surface currents are felt mainly as moderate winds.

The *zone of calms* is a region extending from about 2° to 11° north latitude. It is caused by the ascending currents near the Equator neutralizing the inblowing polar currents, thus producing calms. From the zone of calms to about 30° on each side of the Equator the polar currents blow with such constancy that they have been named *trade winds,* from their value to commerce. In the Northern Hemisphere their direction is northeast and in the Southern it is southeast. Beyond the trade winds is a region of *periodical calms,* and still farther toward the poles is a great belt of variable winds, in which the equatorial and polar currents alternate as predominating winds. Besides these are numerous winds that bear local names, such as the typhoon, sirocco, harmattan, etesian, and simoom. The light winds of the Indian Ocean are called *monsoons;* the hot desert winds sweeping across Northern Africa, *simooms;* the storms in the Gulf of Guinea, *tornadoes;* and those of the Pacific, *typhoons. Chinook winds* are those occurring on the eastern slopes of the mountains from Colorado to the Peace River. They are warm and dry, continuing from a few hours to several days and usually coming from a westerly or northerly direction. See **Whirlwind.**

WINDER (wĭn′dẽr), **William Henry,** soldier, born in Somerset County, Maryland, Feb. 28, 1775; died Feb. 7, 1824. He studied at the University of Pennsylvania and took up the practice of law. In 1812 he was made colonel in the military service and in the same year commanded an expedition that invaded Canada from Black Rock, N. Y. The following year he was promoted to brigadier general and was taken prisoner at Stony Creek, but was released in 1814 He commanded at the Battle of Bladensburg, where he was defeated, and thus became unable to prevent the British occupation of Washington. At the close of the war he was honorably discharged and took up the practice of law in Maryland, where he was elected to the State senate.

WINDERMERE (wĭn′dẽr-mẽr), a freshwater lake of England, in the northwestern part of the country. It lies in the counties of Lancashire and Westmorland. The overflow is by the Leven River into Morecambe Bay, an extension of the Irish Sea. The lake is one mile wide and fourteen miles long and contains a number of fertile islands. Rydal, the home of Wordsworth, is situated near its northern extremity.

WINDLASS (wĭnd′lạs), a familiar form of the wheel and axle, used for raising weights by means of winding a chain or rope around a cylinder. The cylinder in the capstand is usually vertical, while in the windlass it is horizontal, and in the latter machine it is made to revolve either by a winch or handspike. See **Wheel and Axle.**

WINDMILL, a machine which is turned by the wind and designed to furnish motive power, as for pumping or for operating mills. Machines of this kind came into use in Europe about the 11th century, but the form was very different from that of the windmills which are now in general use. They consisted essentially of a rotating cap attached to the tower, with four to six canvas-covered frames to receive the wind and an eccentric attached to the shaft for driving the machinery below. Windmills of similar construction are still employed to a considerable extent for pumping in the dike regions of the Netherlands. The windmills used extensively at present for pumping water on farms consist of a tower, trestled or inclosed, within which is a shaft having at the top a rotary shaft set at right angles, bearing a steering rudder at one end and a system of adjustable slats or sails radiating from the other.

In most mills the sails are made of narrow wooden slats, forming a circular disk, but sheet iron and steel turbine sails have gone largely into use within recent years. To keep the sails facing the wind, a self-adjusting fan or flyer is attached to the projecting framework at the rear. As the mill is turned by the air it revolves a crank, which transmits motion to the machinery below. Power cannot be obtained by means of a windmill unless there is a reasonable movement of air. Considerable advantage is gained by placing the windmill on a lofty tower, but it has been found that the average time a windmill can be utilized does not exceed 10 hours out of 24, though this depends very largely upon the locality where it is situated. On many farms an automatic mechanism is placed in a watering tank, which serves to stop the mill when the tank is pumped full of water. In some localities tracts of land are irrigated by water being pumped by means of windmills.

WINDOM (wĭn′dŭm), **William,** statesman,

born in Waterford, Ohio, June 10, 1827; died in New York City, Jan. 29, 1891. After attending the public schools and an academy, he studied law and in 1850 was admitted to the Ohio bar. Soon after he removed to Minnesota and served as a member of Congress from 1859 to 1869 and was United States Senator from 1870 to 1881. President Garfield appointed him Secretary of the Treasury in 1881, but he resigned at the death of the latter, and again served as United States Senator from 1881 to 1883. His eminent success and statesmanship caused President Harrison to select him as Secretary of the Treasury in 1889, but he died before the expiration of his term, after concluding an important speech at Delmonico's.

WINDOW, an opening in the wall or certain parts of the roof of a building, intended for the admission of light and partly as a means of ventilation. Openings of this kind were common among the people of ancient times, but they were comparatively small and few in number. The Egyptians had windows in dwellings and structures intended for military purposes, but rarely employed them in buildings intended for religious worship. The Greeks use glass to a considerable extent in covering the openings to prevent the admission of external air, but the forms were very irregular, usually of triangular or oblong outline. Windows were common among the Romans, who enlarged the openings, thus securing an increase in light and a better command of the surrounding prospect. In Western Europe the openings in the walls were little more than narrow slits until the 12th century, when glass came into general use. Stained glass has continued to be popular for churches and chapels, but has gone largely out of style for private dwellings, although some windows, where the view is obstructed, are either of stained or glazed glass.

The forms of windows used at present are almost endless in variety, but most of them may be grouped under two styles known as the Gothic and the Italian. These styles are alike serviceable in contributing to the general decoration or architectural effect of a building. At the same time they serve the purpose of admitting light and external air, as well as shutting out cold and moisture. Windows in shops and stores are generally large in size, from ten to fifteen feet square, and are made of plate glass. The glass is usually set in a frame, or sash, which is made of wood or metal.

WINDSOR (wĭn'zẽr), a city of Canada, in the Province of Ontario, on the Detroit River, opposite Detroit, Mich. It is on the Wabash, the Grand Trunk, the Michigan Central, the Canadian Pacific, and other railroads. Extensive wharves and regular communication by steamboats are maintained. The noteworthy buildings include the city hall, the high school, the public library, the International Hotel, and many churches. It has a large trade in live stock, cereals, lumber, and merchandise. The manufactures include salt, cotton and woolen textiles, ironware, shoes, lumber products and machinery. The place has sanitary sewerage, public waterworks, electric street railways, and other municipal facilities. Limestone and salt deposits are worked in the vicinity. Population, 1901, 12,153; in 1921, 38,591.

WINDSOR, a town of England, in Berks County, 22 miles west of London. It is finely situated on the Thames River and may be reached by railways and steamboats. Windsor Castle, the noted palace of the English sovereigns, is its chief attraction. This fine structure is situated on the east side of the town, where its elevated site furnishes a grand view of the Thames River and surrounding region. The history of Windsor dates from the reign of Henry III., who erected a tower on the present site of the palace, but Edward III. rebuilt it in 1344, largely to accommodate the Knights of the Garter. As at present arranged, the castle occupies the so-called Little Park, a tract of land four miles in circumference, while surrounding the latter is the Great Park, having a circuit of eighteen miles. Windsor Forest is a still larger park, which contains many oaks estimated to have grown fully a thousand years. Among the chief attractions are Saint George's Chapel, the installing place of the Knights of the Garter; the round tower or keep, formerly used for state prisoners; and the old and new state apartments In Saint George's Chapel are the vaults of many sovereigns, including Henry VI., Henry VIII., George III., George IV., William IV., and the unfortunate Charles I. It has a royal library with beautiful collections of drawings, portraits, paintings, and valuable printed volumes. The town of Windsor has few manufactures aside from tapestry, but is a point of interest to tourists. It has a number of fine schools, churches, and hotels. Population, 1918, 14,386.

WINDWARD ISLANDS (wĭnd'wẽrd), an island group of the Lesser Antilles, lying east of the Caribbean Sea and extending between the Leeward Islands and Trinidad. The name is applied somewhat loosely to include Martinique, an island belonging to France, but in a more restricted sense it has reference to the British colony comprising all the islands between Trinidad and Martinique, lying west of Barbadoes. This colony has an area of 524 square miles. It includes the islands of Saint Vincent, Saint Lucia, Grenada, and the Grenadines. Negroes constitute the chief part of the inhabitants. Among the principal productions are coffee, sugar, spices, cacao, rum, and tropical fruits. The climate is quite favorable, but hurricanes are frequent and the rainfall is excessive. Saint George's, on Grenada, is the capital and seat of government.

WINE, the fermented juice of fruits, but the name is applied more particularly to the product obtained by fermenting the juice of the grape. Many widely different varieties of wine are manufactured, the peculiar qualities depending upon the season, age, climatic conditions, and the fruits used in their production. All these more or less influence the flavor, color, and effect upon the tongue and palate. Wines are said to be *dry* when they contain little or no sugar and *sweet,* when the proportion of sugar is clearly perceptible to the taste, but between these two extremes are many marketable varieties. The essential ingredients of wine are alcohol, water, and coloring matters, but besides these wines contain glycerin, volatile oil, grape sugar, vegetable albumen, calcium tartrate, gum, and various acids, such as phosphoric, acetic, and carbonic acid. The proportion of alcohol varies from seven per cent. in certain elderberry wines to 25 per cent. in certain sherries. Wines bottled while still fermenting contain carbonic acid gas and when uncorked foam slightly and have a brisk effect upon the tongue. These are called *sparkling wines,* while those that do not sparkle are designated *still wines.*

The annual production of wine in the United States averaged 55,000,000 gallons, but its manufacture was forbidden in 1920. California wines were counted among the best, owing to the favorable climate and the vigorous growth of the grape on the Pacific slope. In ancient times the most celebrated wines were made by the Greeks in Lesbos and Chios and by the Romans in Cecuban. France, Germany, Spain, Italy, Portugal, Austria and Turkey are the chief wine-producing countries of Europe. Many grades of wine have a wide and favorable reputation. *Bordeaux, Burgundy,* and *Champagne* are made in France; *Rhine wine* and *Moselle,* in Germany; *Tokay,* in Austria-Hungary; *sherry* and *port,* in Spain and Portugal; *Oporto,* in Portugal; and *Madeira,* in the island of Madeira, off the western coast of Africa.

The manufacture of wine from grapes is an easy art in the grape-producing regions. In making the better grades of wine much care is exercised in selecting only the fully developed berries, all the faulty and unripe portions being carefully separated by hand. After removing the berries from the stems, they are placed in a wine press or large tub, where they are crushed to separate the juice from the skin and seed, which is usually done by a lever-and-wedge press. In some countries the crushing is effected by men treading the grapes with their naked feet in shallow tubs. Usually the grapes are pressed several times, the expressed juice equaling about seventy per cent. of the grapes by weight. The juice has a sweet taste when first expressed from the grapes and is called *must.* It is placed in vats to ferment, the process of fermentation requiring a few hours or a few days, this depending upon the temperature. Small bubbles of carbonic acid gas are given off in the process of fermentation and the sugar of the juice is converted into alcohol. The fermented juice becomes clear after fermentation ceases and is drawn off into casks, in which a second or lighter fermentation takes place. As soon as fermentation ceases, the casks are closed and are ready for storage or for the market. In making Champagne wine the grapes are picked before they become entirely ripe, while port and Rhine wines require quite well-ripened grapes. The color is due to the skins. In making white wines the skins are removed before expressing the juice. Other fruits used in making wines include cherries, oranges, currants, gooseberries, elderberries, raspberries, blackberries, and many others.

WINEBRENNER (wīn'brĕn-nĕr), **John,** clergyman, born in Frederick County, Maryland, March 24, 1797; died in Harrisburg, Pa., Sept. 12, 1860. He graduated from Dickinson College and, after studying theology in Philadelphia, was appointed pastor of the German Reformed Church in Harrisburg, Pa. In 1830 he left that sect and organized the Church of God, whose chief tenets are the washing of feet, baptism by immersion, and partaking of the Lord's Supper. This sect is most strongly represented in the eastern and middle states. At present it has 575 ministers, 75,000 communicants, and church property valued at $1,115,000. The chief printing office is at Harrisburg, Pa. Winebrenner published "Brief Views of the Church of God," "History of All the Religious Denominations in the United States," "Church Hymn Book," "Pronouncing Testament and Gazetteer," and "Treatise on Regeneration." He was editor for some time of the *Gospel Publisher,* now the *Church Advocate.*

WINFIELD (wĭn'fēld), a city in Kansas, county seat of Cowley County, on the Walnut River, forty miles southeast of Wichita, on the Missouri Pacific, the Saint Louis and San Francisco, and the Atchison, Topeka and Santa Fé railroads. The surrounding country is fertile. The streets are improved by grading, waterworks, and electric lighting. Near the city is a Chautauqua ground. The noteworthy buildings include the county courthouse, the public library, the State Imbecile Asylum, the Saint John's Lutheran College, and the Southwest Kansas College. It has a growing trade in farm produce and live stock. The manufacturing establishments include flouring mills and machine shops. Limestone quarries are worked in its vicinity. The place was settled in 1870 and incorporated in 1871. Population, 1904, 7,758; in 1920, 7,933.

WINGED LION, an emblem of Saint Mark, the patron saint of Venice, Italy. It is situated on one of the columns of the Piazzetta at Venice and is constructed entirely of bronze. Na-

poleon carried it to Paris in 1797, but it was restored to Venice in 1815.

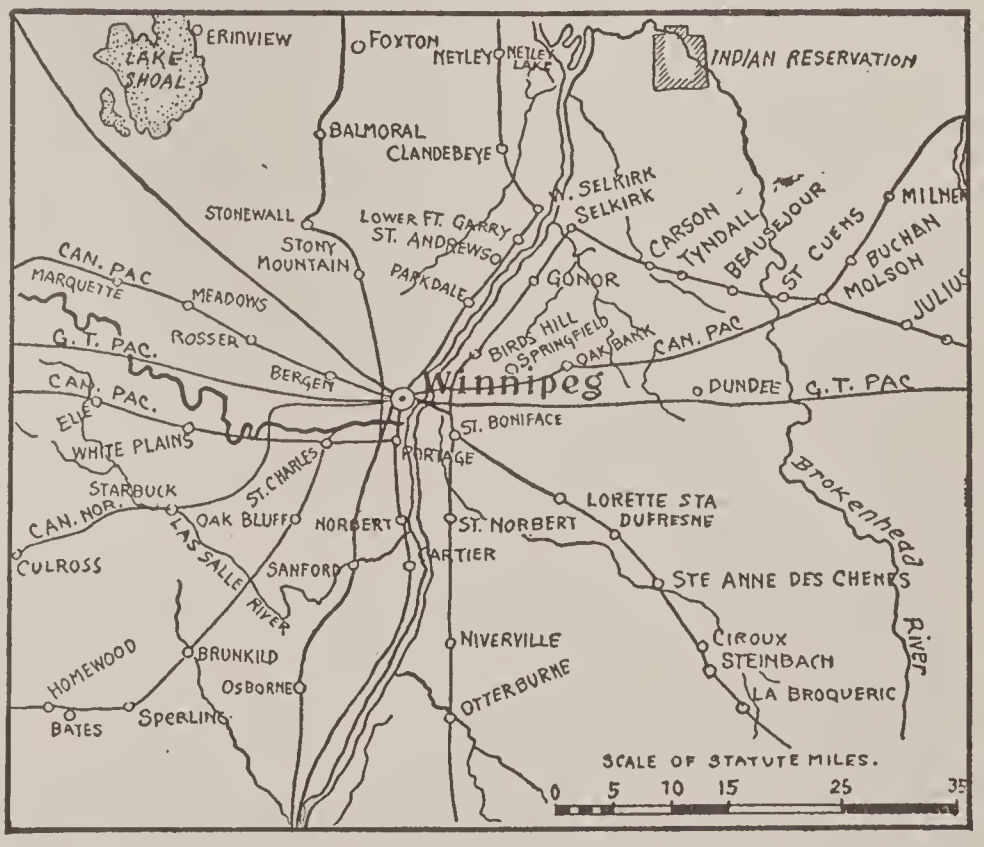
WINKELRIED (vĭŋ′kẹl-rēt), **Arnold Struth von,** famous patriot of Switzerland, next to William Tell the most celebrated public man in Swiss history. The chief event with which his name has become inseparably connected is the Battle of Sempach, in 1386, when a small band of Swiss peasants opposed an army of 4,000 Austrian veterans. Leopold, the Austrian commander, had formed a solid phalanx by crowding his men with extended lances into a formidable body. Upon them rushed the Swiss patriots with remarkable bravery, but they were repulsed with great loss. At that opportune time Arnold von Winkelried, a leader of the Unterwalden forces, rushed forward and grasped a number of spears, thus making an opening through which the Swiss mountaineers rushed with heroic bravery and defeated the Austrians. Though Winkelried fell, pierced with a dozen lances, his noble deed won the independence of his country. His wife and children were carefully provided for by his comrades. A fine monument was erected to his honor in his native canton, Unterlinden, in 1865.

WINNEBAGO (wĭn-nē-bā′gō), the largest lake of Wisconsin, in Winnebago County, forty miles west of Lake Michigan. It receives the water from the Fox and Wolf rivers and the overflow from Lake Poygan. The length is about 30 miles, the greatest width is 10 miles, and the area is 218 square miles. It discharges through the Fox River into Green Bay. The Fox River is navigable, making the lake of value for transportation. It has fine fisheries. On its shores are the cities of Menasha, Fond du Lac, and Oshkosh.

WINNEBAGOES (wĭn-nē-bā′gōz), an Indian tribe of the Dakota family, first met with by French traders in the Green Bay region of Wisconsin. They were a powerful tribe in the 16th century and opposed the Algonquins with considerable vigor, but in the next century an alliance was formed against them and their numbers became greatly reduced. In the French and Indian War they sided with the French, but joined the British against the colonies in the Revolution. General Wayne reduced them in 1793 and 1794. They sided against the Americans in the War of 1812. Subsequently they joined the alliance under Tecumseh. In 1829 they ceded large tracts of land and in 1866 they accepted certain lands in the vicinity of Winnebago, Neb. Several Protestant and Catholic missions and a number of schools have been conducted among them, and many have made material advancement in education and civil arts. At present they number about 2,125.

WINNIPEG (wĭn′nĭ-pĕg), a lake of Canada, lying in Manitoba, Keewatin, and Saskatchewan. The length is 275 miles, the width is from 40 to 62 miles; and the area is about 8,940 square miles. A basin of 395,000 square miles drains into it. The surface is 710 feet above the level of the sea. It receives the water from the Red River of the North, the Assiniboine, and the Saskatchewan rivers and its overflow passes by the Nelson into Hudson Bay. Lake Winnipeg receives the discharge from the Lake of the Woods by the Winnipeg River, a stream about 290 miles long. It has excellent fisheries, but navigation is obstructed by ice about six months of the year.

WINNIPEG, a city of Canada, capital of Manitoba, 1,124 miles west by north of Montreal and 398 miles northwest of Saint Paul, Minn. It is situated at the junction of the Assiniboine with the Red River, through which it has access to Lake Winnipeg. The transportation facilities are very extensive by the Canadian Pacific, the Canadian Northern, the Grand Trunk, the Northern Pacific, and the Great Northern railroads. Intercommunication is afforded by a system of electric railways, which operates branches to many suburban and interurban points,



and a railway line extends to the shore of Lake Winnipeg. The streets are regularly platted, crossing each other at right angles, and several fine squares and public parks are maintained in good condition. A fine residential district is located south of Portage Avenue, but handsome residences are maintained in other portions of the city, especially in Fort Rouge, the portion located south of the Assiniboine.

The city is built largely of stone and vitrified brick and many of the buildings are tall and substantial. Among the larger structures are

the parliament house, the city hall, the customhouse, the Royal Alexander, the Empire, and the Queen's hotels, and numerous churches. Winnipeg is noted as an educational center, having a well-established system of public schools, a number of historical and scientific societies, and many hospitals and institutions of secondary and higher education. Among the leading educational and professional institutions are the University of Manitoba, the Saint John's College, the Manitoba Medical College, the Saint Boniface College, and the Manitoba College. Saint Boniface, a town with a large French population, is on the east bank of the Red River, connected with Winnipeg by a number of bridges.

Winnipeg is surrounded by a fertile farming country. It has a large trade in lumber, wheat, hides, live stock, and merchandise. It ranks as the greatest grain market in the British Empire. Within the last two decades it has developed extensive manufacturing interests, and its fine transportation facilities have caused the building of a vast wholesaling trade. Among the chief manufactures are flour and grist, boots and shoes, clothing and hosiery, lumber products, brick and pottery, carriages, machinery, hardware, and farming implements. It has extensive railway shops of the Canadian Pacific and is important as a banking and financial center.

The history of Winnipeg may be said to have its beginning in 1870, but before that time it was known as Fort Garry, when it was important as a trading post of the Hudson's Bay Company. A band of insurgents under Louis Riel had taken possession of Fort Garry early in 1870, and Wolseley was dispatched with a military force to dispossess them. At that time about 200 people resided in the vicinity and these served as the nucleus of the present metropolis. Soon after railway communication was established through Minnesota, and the completion of the Canadian Pacific in 1881 augmented the rapid growth. The phenomenal development of the agricultural lands in Manitoba and the country west gave the city an unusual impetus. It is now one of the best built and most progressive cities of the Dominion. Population, 1901, 42,340; in 1921, 179,087.

WINNIPEGOOSIS (wĭn-nĭ-pē-gōō'sĭs), or **Winnipegoos,** a lake in the provinces of Manitoba and Saskatchewan, Canada, lying west of Lake Winnipeg. The length from north to south is 128 miles and the width is from 12 to 24 miles. It has an area of 1,985 square miles. The shores are indented by numerous bays. South of it is Lake Manitoba, into which it discharges by the Waterhen River. It receives the water from Swan and Red Deer rivers. The overflow, after reaching Lake Manitoba, is discharged by the Douphin River and Saint Martins Lake into Lake Winnipeg, whence it passes into Hudson Bay by the Nelson River. In the vicinity are fine forests.

WINNIPISEOGEE (wĭn-ē-pē-sä'ke), or **Winnipesockee,** a lake in New Hampshire, lying between Belknap and Carroll counties, 22 miles northeast of Concord. It is twenty miles long and from four to ten miles wide. The area is 176 square miles. It has an altitude of 472 feet above the sea. The shores are more or less abrupt and indented by deep bays. It has excellent fisheries and the fine scenery and numerous islands make it a favorite summer resort. The overflow is discharged by the Winnipiseogee River, which unites with the Pemigewasset River to form the Merrimac.

WINONA (wī-nō'nȧ), a city in Minnesota, county seat of Winona County, on the Mississippi River, 102 miles southeast of Saint Paul. It is on the Chicago Great Western, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and other railroads. The surrounding country is highly fertile, producing cereals, grasses, and dairy products. Among the chief buildings are the county courthouse, the Federal post office, the Winona Seminary, the public library, the State normal school, the Margaret Simpson Home, and many fine school and church buildings. It has large interests in wholesaling, in grain and lumber, and in manufacturing. Among the leading manufactures are lumber products, ironware, flour, carriages, boots and shoes, bicycles, and farming implements. An extensive system of street railways furnishes transportation to all parts of the city and many adjoining places of interest. Other utilities include public waterworks and a system of sanitary sewerage. Winona was settled in 1851 and chartered as a city in 1857. Population. 1905, 20,334; in 1920, 19,143.

WINSLOW (wĭnz'lō), **Edward,** Governor of Plymouth Colony, born in Droitwich, England, Oct. 19, 1595; died May 8, 1665. Religious persecutions in England caused him to seek a refuge in Holland, where he became a member of Robinson's church at Leyden, and in 1620 came to New England in the *Mayflower.* His wife died shortly after reaching Plymouth, and he afterward contracted the first wedding in the Plymouth colony by marrying Mrs. Susanna White. He won the friendship of Massasoit, the Indian chief, while treating him in a case of sickness, and afterward made several tours to England for the colony. In 1624 he became a magistrate and was chosen governor in 1633, 1636, and 1644. He represented his colony in the New England confederation. Cromwell appointed him head commissioner of an expedition against the Spanish West Indies, but he died while on the voyage. Winslow wrote several religious works and a history entitled "Good News from New England." Other writings from his pen include "Hypocrisy Unmasked" and "Glorious Progress of the Gospel Among the Indians."

WINSLOW, John Ancrum, naval officer, born in Wilmington, N. C., Nov. 19, 1811; died in Boston, Mass., Sept. 29, 1873. In 1827 he

became a midshipman in the navy, was made lieutenant in 1839, and for gallant service in the Mexican War became commander of the schooner *Morris*. He was promoted to the rank of commander in 1855 and became captain in 1862. In 1863 he was given command of the *Kearsarge*. On June 19, 1864, he attacked the privateer *Alabama* off Cherbourg, France, and after an engagement of an hour shattered and sunk that vessel. He commanded the gulf squadron from 1866 to 1867 and in 1870 became rear admiral. In the latter year he was made commander of the Pacific squadron, but retired from active service the following year.

WINSOR (wĭn'zẽr), **Justin**, librarian and author, born in Boston, Mass., Jan. 2, 1831; died Oct. 22, 1897. After studying at Harvard University, he pursued courses in Paris and at Heidelberg, Germany. He became superintendent of the public library of Boston in 1868, and in 1877 was made librarian of Harvard. In 1876 he was elected first president of the American Library Association. His writings are very numerous and cover a wide range of subjects. A large number of them were contributions to periodicals. His best known public works include "Christopher Columbus," "The Mississippi Basin," "Biography of Original Quartos and Folios of Shakespeare," "Life and Times of David Garrick," "From Cartier to Frontenac," and "Critical History of the United States."

WINSTED (wĭn'stĕd), a city of Connecticut, one of the county seats of Litchfield County, 28 miles northwest of Hartford. It is located on the Mad and Still rivers and on the Central New England and the New York, New Haven and Hartford railroads. The chief buildings include those of the county, the townhall, the Gilbert Home for Poor Children, and the Litchfield County Hospital. Excellent water power is derived from the Mad River. It has manufactures of cutlery, leather, clocks, clothing, pins, and machinery. Electric lighting, waterworks, and sewerage are among the public utilities. The first settlement was made in 1756 and it was incorporated in 1858. Population, 1900, 6,804; in 1920, 8,248.

WINSTON (wĭn'stŭn), a city of North Carolina, county seat of Forsyth County, 28 miles west of Greensboro, on the Southern and the Norfolk and Western railroads. It joins Salem, a municipality with 3,642 inhabitants, the two places being known as Winston-Salem. Among the noteworthy buildings are the county courthouse, the Federal post office, the Salem Female Academy, and the Slater Industrial Academy and Normal School. It is an important manufacturing and trade center. The manufactures include cotton and woolen goods, ironware, clothing, cigars, machinery, and farming implements. It has good municipal improvements, including electric lighting, sewerage, waterworks, and street railways. The Moravians founded Salem in 1766. Population, 1920, 48,395.

WINTER, the coldest season of the year, following autumn and preceding spring. It begins astronomically, in the Northern Hemisphere, on the shortest day, Dec. 21, and ends with the vernal equinox, March 21. In popular use the name winter is applied to the three coldest months, which are November, December, and January in Great Britain and December, January, and February in Canada and the United States. In the tropical zone the rainy season is termed winter. The winter months of the Southern Hemisphere are June, July, and August.

WINTER, William, poet and critic, born in Gloucester, Mass., July 15, 1836. He studied in Boston, took a course at the Harvard Law School, and became a contributor to the Boston *Transcript*. Subsequently he removed to New York, where he wrote for six years as an editor of the *Saturday Press*, and in 1865 became literary critic of the New York *Weekly Review*. He visited Europe in 1877 and on returning to America published "Trip to England." Among his best works are "Old Shrines and Ivy," "Life of Henry Irving," "Shadows of the Stage," "Stage Life of Mary Anderson," "My Witness," and "Sketches of Scotland." He died June 30, 1917.

WINTERGREEN (wĭn'tẽr-grēn), the name of several species of plants of the heath family, which are mostly native to the Northern Hemisphere. They are perennial herbs and grow as half-shrubby plants in low woods. The *checkerberry*, whose aromatic leaves yield the oil of wintergreen, is a noteworthy American species. It has slender stems, which creep near the surface of the ground, and the ascending flowers are followed by red berries. It is sometimes called *partridge berry, creeping wintergreen, mountain tea,* and *boxberry*. The *flowering wintergreen* is another familiar species of North America, having short, erect stems and

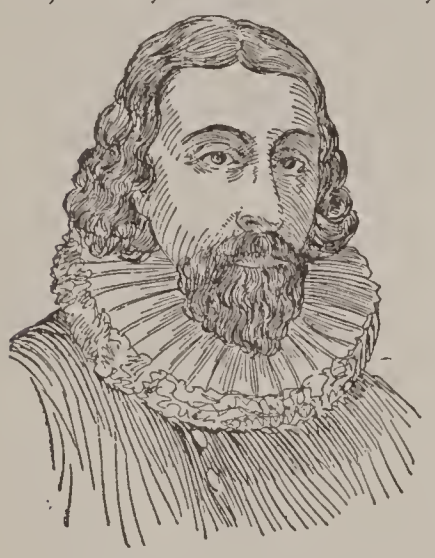


FLOWERING WINTERGREEN.

conspicuous rose flowers. The *spotted wintergreen* is common in the dry woods from Georgia to New Brunswick.

WINTHROP (wĭn′thrŭp), a town of Massachusetts, in Suffolk County, five miles northeast of Boston, on Massachusetts Bay and on the Boston, Revere Beech and Lynn Railroad. It is popular as a summer resort and residential center. The chief buildings include the Frost public library, the high school, and numerous summer hotels. It contains the house of Dean Winthrop, dating from 1649. The Winthrop Shore Reservation and Ingall's Park are favorite public grounds. The town has manufactures of clothing, gloves, calfskins, and machinery. It was incorporated in 1852. Population, 1905, 7,034; in 1920, 15,446.

WINTHROP, John, Governor of the Massachusetts colony, born in Groton, England, Jan. 12, 1588; died in Boston, Mass., March 26, 1649.



JOHN WINTHROP.

He graduated at Cambridge University and afterward studied law. Soon after he opposed the parliamentary policy of the Stuarts, became noted as a devout Puritan, and in 1629 was made Governor of the Massachusetts Bay Colony. He came to Salem, Mass., in 1630 with 900 colonists and continued as governor until his death, except in the two periods from 1634 to 1637 and from 1640 to 1646. In the controversy between Governor Vane and Anne Hutchinson he supported the latter. No colonist stands higher in respect to ability and character among the early settlers of New England. He wrote a valuable journal of events in the colony, which was published under the title, "History of New England." His son, John Winthrop (1606-1676), was elected Governor of Connecticut in 1657 and held the office until his death, except one year. He obtained a charter from Charles II. in 1663 by which the colonies of New Haven and Connecticut became united.

WINTHROP, Robert Charles, public man, born in Boston, Mass., May 12, 1809; died Nov. 16, 1894. He descended from John Winthrop, the early Governor of Massachusetts. In 1828 he graduated from Harvard University, studied law with Daniel Webster, and was elected to the Legislature as a Whig. He was elected to Congress in 1840, in which he served as an influential member for ten years, and was speaker of that body for one term. In 1850 he succeeded Daniel Webster as United States Senator, but Charles Sumner defeated him when he was a candidate for reëlection. He was strenuously opposed to slavery and the Mexican War, favored the compromise measures in 1850, and in 1856 and 1864 supported the Democrat party. Much of his time after 1854 was spent in the study of historical literature. As an orator he took high rank and delivered the eulogies upon Edward Everett and William H. Prescott.

WINTHROP, Theodore, author, born in New Haven, Conn., Sept. 22, 1828; slain June 10, 1861. He descended from John Winthrop, graduated at Yale University in 1848, and spent two years in European travel. Subsequently he engaged with the Pacific Mail Steamship Company. In 1853 he aided in surveying a canal across the Isthmus of Panama. He was admitted to the bar in 1855 and shortly after opened a law office in Saint Louis, where he gave much attention to literary work. At the beginning of the Civil War he joined a New York regiment and became military secretary to General Butler with the rank of major. He was killed by a shot while in action at Big Bethel, Virginia. His writings include "Life in the Open Air," "Love and Skates" "Cecil Dreeme" "The Canoe and the Saddle," and "Edwin Brothertoft." He contributed many articles of interest to the *Atlantic Monthly*.

WIRE, an even thread or slender rod of ductile metal, formerly made by hammering, but now formed by drawing through dies or holes. Though usually cylindrical, it is made in various other forms, as square, oval, and triangular. The process of making wire is called *drawing* and depends upon the kind of metal and the nature of the product desired. Iron and steel wires are manufactured by passing a billet of metal through the rolls in a rod mill until it is reduced to the desired size of rod. This rod is cleaned and scaled, usually by submerging in diluted sulphuric acid, and then is thrashed, a process in which the wire rod or coil is raised high in the air and thrown heavily to the ground to loosen the scale and dirt. It is then pointed on one end to enable the wire-drawer to grasp it with his tongs as it is started through the die or plate. The end is next fastened to a cast-iron reel, which is put in motion and the wire is drawn through the die with great force, thus reducing it one or more sizes in diameter. If it is desired to still further reduce the size, the wire is annealed or softened by heating, when the drawing may be repeated by pulling the wire through smaller dies.

Iron and steel dies are commonly employed in manufacturing wire, but diamond or ruby dies are required where it is necessary to have much accuracy and fineness. The larger size of wire does not exceed three-tenths of an inch. When the product is thicker than three-tenths of an inch, it is called a *rod,* but the only limit to its fineness is the ability of the workmen to reduce it. Gold and platinum wires used in the micrometers of telescopes are the finest, some being only $\frac{1}{18,000}$ of an inch in diameter. Wire drawing is utilized for a great variety of

purposes, and the products serve many economic uses. Among the many uses of wire are for pins and needles, fences, baling hay, handles for pails, telegraphs and telephones, strings for musical instruments, spokes in bicycles, wire netting, and book sewing. Steel wire is now in general use in the industries. Filigree work is made of gold and silver wire.

WIRELESS TELEGRAPHY. See **Telegraph, Wireless.**

WIREWORM, the name applied to the larvae of various beetles, but especially to several species of elaters. The beetles of these larvae are generally known under the names of *click beetles* and *spring beetles.* While in the larval state they feed upon the roots of living plants, to many of which they are injurious. The worms attain maturity in a period of one to five years and within this time undergo many molts. In some places the wireworms are harmful to wheat and corn. See **Click Beetle.**

WIRT, William, jurist and author, born in Bladensburg, Md., Nov. 8, 1772; died in Washington, D. C., Feb. 18, 1834. He attended the common schools of Maryland, studied to become a lawyer, and in 1792 began the practice of law at Culpeper Courthouse, Va. In 1808 he served as a member of the Virginia house of delegates, became district attorney in 1816, and was attorney general of the United States from 1817 to 1829. He was nominated by the Anti-Masonic party for President in 1832, receiving 33,108 popular votes and seven electoral votes, the latter being those of Vermont. Wirt delivered able arguments in prosecuting the trial of Aaron Burr and in the Dartmouth College Case. His writings include "Letters of the English Spy," "Life of Patrick Henry," "Address on the Triumph of Liberty in France," "Eloquence of the Pulpit," and "The Rainbow." He contributed to many representative magazines.

WISCONSIN (wĭs-kŏn′sĭn), a north central State of the United States, popularly called the *Badger State.* It is bounded on the north by Lake Superior and Upper Michigan, east by Upper Michigan and Lake Michigan, south by Illinois, and west by Iowa and Minnesota. The greater part of the western boundary is formed by the Mississippi and Saint Croix rivers. A small portion of the northwestern border is formed by the Saint Louis River, while the Menominee and the Montreal rivers separate it in part from Upper Michigan. The length from north to south is 315 miles and the greatest breadth is 294 miles. The area is 56,040 square miles, which includes 1,590 square miles water surface.

Description. The surface is an undulating plain and from the southeastern corner toward the northwest is a divide between Lake Michigan and the Mississippi basin. This divide has a general altitude of about 1,000 feet and in the northern part, a short distance south of Lake Superior, it is intersected by another ridge which extends east and west. The latter is quite hilly and includes the Gogebic Iron Range, which has elevations of from 900 to 1,780 feet above sea level. The most elevated portion is near Lake Superior, but here the surface slopes quite abruptly toward the shore, where the elevation is 600 feet. Bluffs of considerable altitude extend along the Mississippi and Green Bay. A wide valley runs across the State from the northeast toward the southwest, in which flows the Wisconsin River. Morains and lakes, resulting from glacial action, are abundant in all parts except the southwest. The glacial area covers about four-fifths of the State.

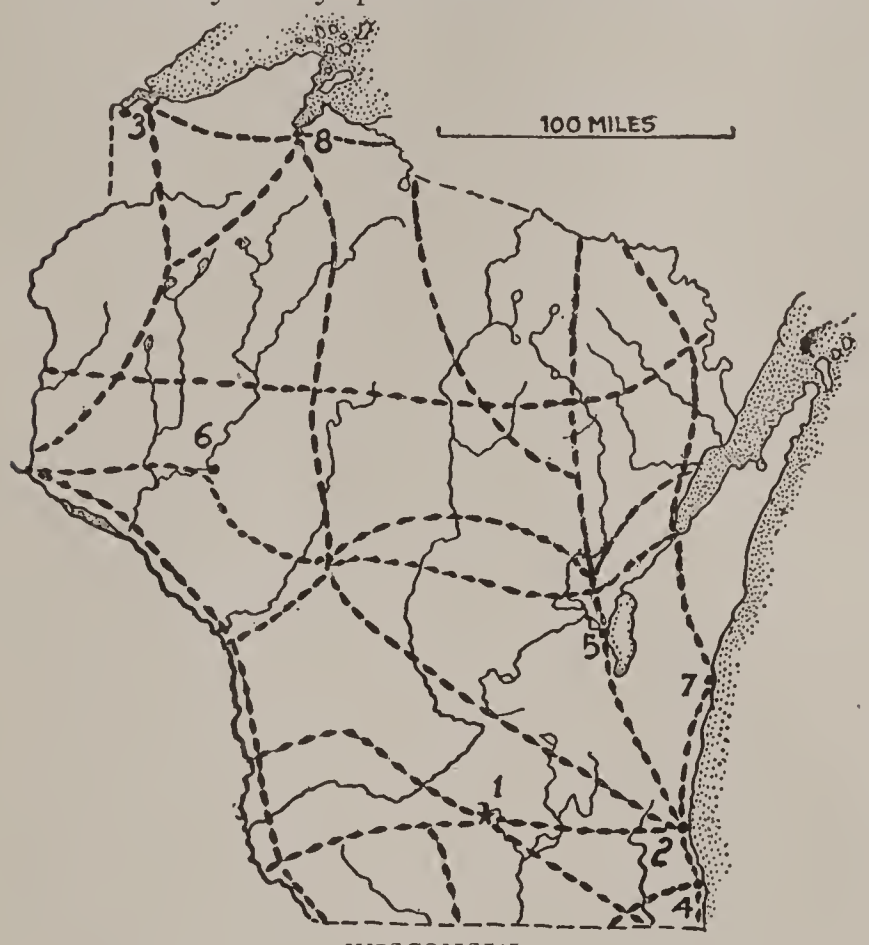
The drainage belongs to a number of systems, but may be generally classed within three drainage areas. In the northern part, north of the Gogebic Iron Range, the drainage is by small streams into Lake Superior. The eastern section is drained into Lake Michigan, while the southern and western parts belong to the Mississippi system. The rivers that drain into Lake Michigan include the Menominee, the Peshtigo, the Oconto, the Wolf, and the Fox rivers, but all of these, except the Fox, are comparatively short. About three-fourths of the surface is drained into the Mississippi, which receives the Saint Croix, the Chippewa, the Black, and the Wisconsin. Sand bluffs of considerable height characterize the course of the Wisconsin, which has beautiful scenery in the vicinity of the Dalles. The Rock and the Des Plaines rivers, though belonging to the Mississippi, cross the border into Illinois. Many of the rivers pass over escarpments, hence are valuable for the water power they furnish. Within the glacial area are about 2,000 lakes, but only a comparatively few are of considerable size. The larger lakes include Winnebago, Oshkosh, Poygan, Tomahawk, and Red Cedar.

The climate is tempered somewhat by proximity to the Great Lakes, but the winters in the northern part are long and severe. Snow covers the ground from early winter until late in the spring throughout the northern half of the State. The extremes of temperature are 25° below zero in winter to 98° or even 102° above in summer. At Bayfield the mean temperature for January is 13° and at Milwaukee it is 20°, while the mean temperature for July at Bayfield is 73° and at Milwaukee it is 70°. Rainfall is abundant in all parts of the State, usually about 30 inches, but it is slightly greater in the east than in the west. Precipitation is greatest between July and October. All parts of the State are healthful.

Mining. The State has extensive mineral interests, especially in the output of iron ore and mineral waters. The latter have a higher value than in any other State and show a constant gain, the annual production being about $2,750,000. Iron ore is obtained along the Gogebic Iron Range in the north, which extends from Michigan through the State to Minnesota, and

the product is shipped largely by steamers on the Great Lakes. Warsaw, Montello, and other points are noted for their output of a superior grade of granite, which is quarried extensively for monument and building purposes. Coal is found in the southern part of the State. Sand suitable for glass as well as clays of commercial value are widely distributed. Productive zinc mines are worked in the vicinity of Plattville and a fine grade of red sandstone is obtained in Bayfield County. Other minerals include limestone, lead, graphite, and mineral paint.

AGRICULTURE. Farming is the leading occupation. Fully sixty per cent. of the area is included in farms, which average 117 acres. Originally the region was covered largely by forests, but much of the stump land of the northern part has been cleared and is utilized in stock raising and for farming. All classes of hardy cereals are grown successfully, and the State occupies a foremost position in the production of oats, barley, rye, and buckwheat. The largest acreage is devoted to the cultivation of hay and forage plants, but it is approximated by the acreage of oats. Corn takes rank as the third crop in acreage. Other crops cultivated extensively are potatoes, peas, tobacco, beans, and sugar beets. Small fruits, such as currants, plums, and strawberries, thrive throughout the State. The southern part is noted for its production of apples, while the central section has large interests in the cultivation of cranberries.



WISCONSIN.

1, Madison; 2, Milwaukee; 3, Superior; 4, Racine; 5, Oshkosh; 6, Eau Claire; 7, Sheboygan; 8, Ashland. Chief railroads shown by dotted lines.

Dairying is an important enterprise in connection with farming, and the State takes a high rank in the output of butter and cheese. The number of cattle exceeds any other class of farm animals, and nearly half of the interests are vested in dairy cows. There has been a constant increase in the number of horses and swine, and the interests in sheep raising are comparatively large. Other domestic animals include mules, goats, and poultry. The annual clip of wool is about $1,700,000.

MANUFACTURE. Wisconsin is important as a lumber-producing State, hence has much material of use in manufacturing. The available forests are chiefly in the northern part. Among the native trees are the oak, pine, maple, hickory, cedar, birch, spruce, and hemlock. Many mills are located on the Menominee, Saint Croix, Wisconsin, Wolf, and Chippewa rivers. Lumber and lumber products have the highest value among the manufactures, but they are followed closely by butter and cheese, flour and grist, tanned and curried leather, malt and spirituous liquors, and foundry and machine-shop products. Among the general manufactures are packed meat, paper, furniture, boots and shoes, carriages and wagons, clothing, textiles, tobacco, and farming implements. Milwaukee, Superior, Racine, La Crosse, and Oshkosh are the leading manufacturing cities.

TRANSPORTATION AND COMMERCE. Excellent facilities for transportation are furnished by the Mississippi River and lakes Superior and Michigan. Railroads were not built in the State until 1850, but the lines now aggregate 7,512 miles. They include trunk lines that cross the State in many directions, furnishing direct connection with points both east and west. Among the principal railroads are the Green Bay and Western, the Chicago, Milwaukee and St. Paul, the Northern Pacific, the Chicago and Northwestern, the Chicago, Burlington and Quincy, and the Minneapolis, Saint Paul and Sault Sainte Marie. Green Bay is connected by a canal with Lake Michigan at Sturgeon Bay, and at Portage is a canal connection between the Fox and the Wisconsin rivers.

The State has large interests in commerce. It exports iron ore, lumber and timber products, malt liquors, dairy products, live stock, wool, flour and grist, potatoes, cranberries, cereals, and tobacco. The imports consist chiefly of cotton goods, machinery, and merchandise. Milwaukee is the principal port of entry.

GOVERNMENT. The present constitution was adopted in 1848, when the State was admitted. It vests the executive power in the governor, lieutenant governor, secretary of State, treasurer, and attorney-general, elected for terms of two years. The superintendent of public instruction is elected for four years at a spring election. Legislative authority is vested in the General Assembly, which consists of a senate of 33 members and a house of representatives of 100 members. The senators are elected for four and the representatives for two years. Sessions of the Legislature are held biennially, beginning on the first Monday in January. A

supreme court of five judges elected for ten years has the highest judicial authority. The power to establish circuit courts is vested in the Legislature, and the judges of these courts are elected by popular vote. Towns, municipalities, and counties have general powers in the administration of local government.

Education. Public instruction is under the direction of a State superintendent, who is assisted by a superintendent of schools in each county. The per cent. of illiteracy is reported at 4.7, which is a slight decrease from that shown in the previous national census. A law enacted in 1907 granted special State aid for a period of three years to ungraded schools, provided certain improvements were made in heating, ventilating, and other equipments. This law has been the means of making the school facilities better and providing more efficiently for the health and comfort of the children. High schools are maintained in all the towns and cities. Many of the rural schools have been consolidated and are organized on an efficient basis under a general course of study. A large number of private and parochial schools are maintained by church and other organizations. Normal schools for the training of teachers are located at La Crosse, Milwaukee, Oshkosh, Platteville, River Falls, Stevens Point, Superior, and White Water.

The University of Wisconsin, located at Madison, is at the head of the public schools and is affiliated closely with the high schools throughout the State. Other institutions of higher learning include the Northwestern University, at Watertown; Gale College, Galesburg; Lawrence University, Appleton; Beloit College, Beloit; Ripon College, Ripon; Milton College, Milton; Marquette College, Milwaukee; Seminary of Saint Francis, Saint Francis; and Concordia College, Milwaukee. Janesville has a school for the blind, Chippewa Falls is the seat of the school for the feeble-minded, and Delavan has an institution for the deaf and dumb. Mendota and Winnebago have hospitals for the insane. The State institution for dependent children is at Sparta. Waupun has the State prison, Green Bay has a State reformatory, and Milwaukee and Waukesha have industrial schools, the former for girls and the latter for boys. Waupaca is the seat of a State soldiers' home and Milwaukee has a national home for soldiers.

Inhabitants. A largé proportion of the people are of foreign birth, and this element is made up largely of Germans and Scandinavians. Germans settled the southeastern part of the State as early as 1840, and this element and their descendants are more numerous than any other class. The leading religious denominations are constituted of the Lutherans, Roman Catholics, Methodists, Baptists, Congregationalists, and Presbyterians. Madison, in the southern part of the State, is the capital. Other cities include Milwaukee, Superior, Racine, La Crosse, Oshkosh, Sheboygan, Green Bay, Eau Claire, Marinette, Fond du Lac, Appleton, Ashland, Janesville, Warsaw, Manitowoc, Kenosha, and Beloit. In 1900, the State had a population of 2,069,042. This included a total colored population of 11,-131, of which number 2,542 were Negroes and 8,372 Indians. In 1905 the population was 2,228,949. Population, 1920, 2,631,839.

History. Wisconsin was formed from the Northwest Territory. Jean Nicollet, LaSalle, and French traders made the first exploration of the region and founded the first settlement at Green Bay in 1639. A Jesuit mission was located at Lapointe by Father Claude Allouez in 1665. In 1763 the region was transferred by the Treaty of Paris to the English and it became a part of the Northwest Territory in 1787. Wisconsin Territory was formed in 1836, but at that time it included Iowa, Minnesota, and part of the Dakotas. It was admitted into the Union on May 29, 1848. The Sacs and Foxes and the Winnebagoes were the chief Indian tribes and many hostilities between them and the early settlers took place at different times, but the Black Hawk War of 1832 finally subdued the Indians.

The State had a large element that favored the emancipation of the slaves in the Union. A convention of antislavery men, held at Ripon in 1854, stimulated the organization of the Free Soil and later the Republican parties. Subsequently the supreme court decided the Fugitive Slave Law to be unconstitutional within the State. A total of 91,379 men aided the Union in the Civil War. Destructive forest fires did much damage at different times, one of the most destructive occurring in 1908.

WISCONSIN, the largest river in Wisconsin, which rises in the northern part of the State, and, after a course of 600 miles toward the southwest, flows into the Mississippi four miles below Prairie du Chien. It is navigable to Portage, 200 miles from its mouth, and is there connected by a canal with the Fox River, thus supplying continuous waterway across the State from Lake Michigan to the Mississippi. The valley is highly fertile and in its upper course contains fine forests. Among the cities on its banks are Grand Rapids, Portage, Merrill, Wausau, Stevens Point, and Rhinelander.

WISCONSIN, University of, an institution of higher learning at Madison, Wis., established in 1838. It is coeducational and receives support from the State and the Federal government. Citizens of the State are admitted free in all departments, except the college of law, while others are charged a nominal tuition. The colleges include those of agriculture, law, letters and science, and engineering, and the courses compare favorably with the leading institutions of America. The grounds of the university border on Lake Mendota, a beautiful sheet of water. It has a library of 85,000 volumes and in

addition contains the library of the State Historical Society, which has 250,000 volumes. The value of the building and grounds is placed at $3,150,000. The faculty includes 300 professors and instructors and the attendance is 6,500 students.

WISE, Henry Alexander, jurist and statesman, born in Drummondtown, Va., Dec. 3, 1806; died in Richmond, Va., Sept. 12, 1876. In 1825 he graduated from Washington College, Pennsylvania, and afterward studied law at Winchester. He was elected to Congress as a Democrat in 1832, serving in that body until 1843. He sided with the Whigs in opposition to the bank policy of Andrew Jackson. In 1840 he supported General Harrison for President, and throughout the administration of John Tyler exercised a powerful political influence. The Senate confirmed his appointment as minister to Brazil in 1844, where he resided until 1847. In 1854 he was elected Governor of Virginia and signed the death warrant of John Brown in 1859. He entered the Confederate service as a brigadier general in 1861, but was generally unsuccessful in a number of engagements. His forces were finally captured on Roanoke Island, Sept. 7, 1862, where his son, Obadiah J. Wise, was slain. He practiced law at Richmond, after the close of the war, and published "Memoir of John Tyler" and "Seven Decades of the Union."

WISEMAN (wīz'mạn), **Nicholas Patrick Stephen,** churchman and writer, born of Irish parents in Seville, Spain, Aug. 3, 1802; died in London, Feb. 15, 1865. After studying academic branches and law in Ireland, he took a course in theology at Rome, where he graduated in 1824. In 1825 he was ordained a Roman Catholic priest, became professor of Oriental languages in the Roman University, and returned to England in 1829. He officiated as a preacher and lecturer and published a number of valuable works, including lectures on the doctrines and practices of the Catholic Church and a treatise on the holy eucharist. Gregory XVI. increased the number of vicars apostolic in England in 1837 and made him coadjutor bishop. Later he became president of Saint Mary's College, and in 1849 was made vicar apostolic of the London district. The Pope summoned him to Rome in 1850 and made him archbishop and afterward a cardinal. Wiseman was a proficient student of Bible history and sciences, excelled in Hebrew and Oriental languages, and was acquainted with many European tongues. His religious works include "Points of Contact Between Science and Art," "Connection of Science and Revealed Religion," "Real Presence of the Body and Blood of Our Lord Jesus Christ in the Eucharist," "Recollections of the Last Four Popes," and "Influence of Words and Thought on Civilization."

WISSMAN (vĭs'män), **Hermann von,** African explorer, born at Frankfort-on-the-Oder, Germany, in 1853; died June 16, 1905. He was trained for a military career and in 1874 became a lieutenant. In 1880 he was made an attaché of the German-African society and accompanied Dr. Pogge on an expedition of discovery. The party left Saint Paul de Loanda, a station on the West African coast, and in April, 1902, reached Nyangwe. From that point Wissman traveled eastward and safely reached Zanzibar. He explored the Kassai River in 1883 and subsequently visited many points of interest in the Congo basin and regions farther north, including lakes Nyassa and Tanganyika. The government of Germany made him a commissioner in 1889 to suppress an Arab uprising in East Africa, and he was governor of that region from 1895 to 1896. He published "Interior Africa," "My Second Tour of Equatorial Africa from the Congo to the Zambesi," and "Under the German Flag Through Africa."

WISTARIA (wĭs-tā'rĭ-à), a genus of climbing shrubs of the bean family, so named after Caspar Wistar (1761-1818), professor in the University of Pennsylvania. The leaves are



WISTARIA.

pinnate and the flowers grow in clusters, generally having a lilac color. The seeds are beanlike, usually numbering five to eight, and grow in a slender pod. Several widely different species are cultivated, the best known being the *common wistaria* and the *Chinese wistaria.* They are favorite plants to cover verandas and walls. Under careful cultivation they grow 18 to 25 feet in a season and produce flowers in profusion. Some have a delicate lilac-purple bloom and in some species the flowers are pure white.

WISTER, Owen, author, born in Philadelphia, Pa., July 14, 1860. He studied at Harvard

University and took up the practice of law, but soon gave his attention to literature. His writings consist chiefly of novels and short stories and many have for their theme the life and character of western subjects. Among his books are "Red Men and White," "The Jimmy John Boss," "The Virginian," "Journey in Search of Christmas," "Ulysses S. Grant, a Biography," "Lin McLean," and "Lady Baltimore."

WITCHCRAFT (wĭch'krȧft), an alleged art which is supposed to be understood by witches and wizards. Evidences are abundant that good people in past ages were led to believe that certain individuals possessed supernatural power or influence by reason of being connected with some inspiration of darkness. It was supposed that these persons had made an oral or written compact with the devil, who came to their assistance in practicing infernal arts as a consideration for having abjured God. The compact was either for a certain number of years or of indefinite duration and not only implied obedience to the evil one, but the latter delivered to the witch an imp or familiar spirit to do whatever was directed. We read of an ecclesiastical decree, published at Ancyra in 350 A. D., in which soothsayers, sorcerers, and magicians were classed as witches and condemned as enemies of God. Many proofs may be cited of profound belief in witchcraft in all the civilized countries throughout the Middle Ages. Executions of supposed witches took place with official sanction in Great Britain as late as 172½. It is remarkable that a judge of the court of queens bench in England declared in the 17th century that the common law recognized witchcraft as a crime. Even Roger Bacon had a pronounced belief in the existence of witches. In literature we find mention of the popular beliefs regarding witchcraft. Goethe's "Faust" is one of the finest examples of the reflection of public opinion. Other notable instances are those of Shakespeare's "Macbeth" and Burns' "Tam O'Shanter."

A deplorable state of public practice prevailed in Europe for many centuries owing to the widespread belief in witches. Pope Innocent VIII. issued a bull in 1484 authorizing torture to secure confessions. These tortures were applied in the most hideous ways. It was believed that the evil one had marked a spot on the body of a witch which was insensible to pain, hence it became a common practice to cut into the flesh or pierce the skin with a sharp instrument in order to find whether the person tortured could be classed as guilty. In some cases persons were thrown into deep water, those floating being regarded innocent, while those sinking were thought certainly to be possessed. The number of persons suffering martyrdom in Europe within a period of four centuries is estimated by some writers at 9,000,000. In 1515 500 persons were executed for witchery in Geneva and 975 were burned at Como in 1524. The total number of deaths in Scotland, owing to charges of witchery, is placed at 4,000. Belief in witchcraft spread rapidly among the Puritans of New England, in 1648, and for more than a century there was a widespread belief in the supposed supernatural power of certain individuals.

Cotton Mather, an eminent pulpit orator, aroused the superstitious to believe in witchery at Salem, Mass., where he preached with earnestness against the art. He wrote two works, entitled "Wonders of the Invisible World" and "Memorable Providences Relating to Witchcraft and Possessions," which had an unfortunate influence among the people. Samuel Willard, a minister of Massachusetts, in 1671, proclaimed that a woman of his congregation was bewitched, but afterward she was proved insane instead of possessed. In the period between 1684 and 1693 more than 100 persons were tried and convicted of witchcraft and many of them were hanged. Nineteen executions for alleged witchcraft took place at Salem in 1692. A man named Giles Corey, aged about eighty years, was pressed to death for refusing to plead in a special court of oyer and terminer. The delusion seems the more deplorable when it is considered that in many cases the evidence of little children and unreliable witnesses was taken as conclusive. Thomas Brattle and Robert Calef of Boston took a very decisive position against the delusion, and it is due largely to their efforts that the belief rapidly passed away.

WITCH-HAZEL (hā'z'l), or **Wych Hazel,** a shrub native to the eastern part of the United States and Canada, growing usually to the height of six to ten feet. The trunk branches near the ground, forming several crooked subtrunks about four inches thick. These plants grow principally in damp woods and are so named from the resemblance of their leaves to the hazel. They bear yellow flowers late in autumn, when the leaves are falling, and the fruit, which is a woody, two-seeded capsule, matures the following summer. The small branches are used as divining rods by those who believe that they turn downward when held in the hand to indicate the location of water and water veins below the surface. The liquidambar is a forest tree belonging to the same class of plants and attains a height of twenty to thirty feet.

WITENAGEMOTE (wĭt'ĕ-nȧ-gĕ-mōt), the national council of the Anglo-Saxons and the forerunner of the English Parliament. The small heptarchy was divided into separate kingdoms and each of these had a general council of this class. It consisted of the thanes, ealdormen, and the higher ecclesiastics and was presided over by the king. This body had general legislative power, concluded treaties, had authority to depose a king, and settled the question of succession to the throne when a dispute arose. In practice a powerful king subverted the authority

of the council to a minor position, but a weak ruler was usually governed by its orders. This body was abolished by William the Conqueror, but not until after it had acknowledged his title to the throne.

WITHERSPOON (wĭth'ẽr-spo͞on), **John,** signer of the Declaration of Independence, born in Gifford, Scotland, Feb. 5, 1722; died near Princeton, N. J., Nov. 15, 1794. He graduated from the University of Edinburgh in 1742, became a Presbyterian pastor at Paisley, and in 1768 accepted the presidency of Princeton College, New Jersey. His administration of the college was highly successful. He introduced lectures on political science, mathematics, international law, and moral philosophy and the study of Hebrew and French. In 1776 he was sent as a representative to the Continental Congress and while in Philadelphia signed the Declaration of Independence. He remained a member of Congress until 1782. His later years were devoted to the administration of the college, in whose interest he visited Europe twice, and spent his last days on a farm near Princeton. In Fairmount Park, Philadelphia, is a fine statue to his honor.

WITNESS (wĭt'nĕs), one who appears before a court and is examined under oath or affirmation as to his knowledge of matters undergoing judicial investigation. The writ by which a witness is summoned to appear is called a *subpoena.* Testimony by a witness may be given in open court, when it is usually recorded by a reporter, or it may be taken before some officer in the form of a written deposition and read at the time of the trial. Any person who is of sound mind and has sufficient capacity to understand the nature of the obligation of an oath is competent to testify as a witness, but in some cases the husband and wife are not allowed to give testimony against each other. A person who signs his name to certify to the genuineness of another signature is termed a *witness.*

WITTE (vĭt'tĕ), **Sergius,** statesman, born in Tiflis, Russia, June 17, 1849. He descended from a family of Dutch immigrants to Russia. In 1870 he graduated at the University of Odessa and soon after entered the railroad service. He was a director of the southwestern railroads during the Russo-Turkish War and in 1888 became head of the department of railway affairs. He was made minister of finance in 1892, became secretary to Nicholas II. in 1896, and was chief peace commissioner to settle the war with Japan in 1905 by negotiating the Treaty of Portsmouth, New Hampshire. His efficient public service caused his appointment as premier of the new cabinet in the same year, but he resigned in 1906. It is due largely to his wise counsel that Russia passed safely through the revolution of 1906. He died March 13, 1915.



SERGIUS WITTE.

WITTENBERG (wĭt'tẹn-bẽrg), a city of Germany, in the province of Saxony, on the Elbe River, 54 miles southwest of Berlin. It is at the junction of several railways. The surrounding country is fertile, producing fruits and cereals in abundance. Wittenberg is famous for its connection with the lives of Luther and Melanchthon, both of whom have tombs in the Schlosskirche, on the door of which Luther nailed his 95 theses. This church now has the theses in Latin upon its bronze doors and within the building are a number of fine paintings showing scenes in the life of Luther. The Stadtkirche is another excellent church. Luther and Melanchthon preached in this building and on its walls are pictures representing famous events connected with the lives of these reformers. The city contains the houses occupied by Luther and Melanchthon. The university in which Luther taught was united with Halle in 1817, but Wittenberg still has a gymnasium, several secondary schools, and the remains of the Augustine monastery. Fine monuments built to the memory of Luther and Melanchthon are in the market place. Wittenberg has beautifully paved streets, waterworks, gas and electric lighting, electric street railways, and several valuable libraries. Among the manufactures are linen and woolen goods, leather, machinery, chemicals, and clothing. It was formerly a strongly fortified place and was the seat of the dukes of Saxony until 1422. In 1806 Napoleon captured it, but it was retaken by the Prussians in 1814. Population, 1915, 20,323.

WOAD (wōd), a genus of plants found in Europe, belonging to the mustard family. Several species furnish a blue dye, which is extracted from the leaves. These plants were the principal source of such dyes until indigo was introduced. The leaves do not contain the blue coloring matter ready formed, but it is produced after subjecting them to a process of fermentation. Formerly the common woad was cultivated extensively for its leaves, which were picked and dried for transportation to the factory, where the coloring matter was developed and extracted. However, indigo, being a finer and stronger blue, has replaced this coloring material. A species of wild woad is found in England, where the Picts are said to have used it in coloring their bodies.

WOBURN (wo͞o'bûrn), a city of Massachusetts, in Middlesex County, ten miles northwest of Boston, on the Boston and Maine Railroad. Among the features are the public library, the high school, and many fine residences of Bos-

ton business men. The manufactures include leather, glue, chemicals, electric supplies, clothing, and machinery. It has public waterworks, electric street railways, and a considerable trade. The place was first settled in 1640 and two years later was incorporated. Population, 1920, 16,565.

WODEN (wō'dẹn), the name of an ancient deity of the Anglo-Saxons, corresponding to Odin of the Scandinavians. Wednesday, the fourth day of the week, was named from him. See **Odin.**

WOERMANN (vẽr'män), **Karl,** poet and historian, born in Hamburg, Germany, in 1844. He studied law at Berlin and Heidelberg and practiced his profession at Hamburg. Subsequently he traveled in Europe and America and, after returning to Germany, took a course in the study of art history at Heidelberg and Munich. In 1874 he was made professor of the history of art at Düsseldorf and in 1882 became director of the picture gallery at Dresden, serving until 1895. Among his chief works are "General History of Art," "Illustrations from Nature," "New Poems," and "Art Among Ancient Peoples."

WÖHLER (vē'lẽr), **Frederick,** noted chemist, born in Eschersheim, near Frankfort, Germany, July 31, 1800; died in Göttingen, Sept. 23, 1882. He studied at Frankfort and Marburg and afterward pursued an advanced course in medicine at Heidelberg, where he graduated as a doctor of surgery and medicine. In 1824 he joined Berzelius and others to make a tour of northern Sweden and Norway. On returning to Germany, he formed the acquaintance of Liebig, and in 1825 became a lecturer on chemistry at Berlin. Subsequently he resided at Cassel, where he aided in establishing an industrial school. In 1836 he was made professor of chemistry at the University of Göttingen. His active career as a teacher extends over a period of more than fifty years, in which time he added much of value to the fund of general knowledge. He accomplished the isolation of aluminum in 1827, the artificial production of formic acid in 1828, and the generation of urea in 1829. His publications include "Text-Book of Chemistry," "Annals of Chemistry and Pharmacy," and "Dictionary of Chemistry."

WOLCOTT (wo͝ol'kŭt), **Edward Oliver,** public man, born at Long Meadow, Mass., March 26, 1848; died March 1, 1905. He served as a volunteer with an Ohio regiment during the later year of the Civil War and subsequently attended Yale University. In 1871 he graduated at Harvard Law School, became a teacher in the schools of Colorado, and subsequently practiced law at Georgetown. He was elected district attorney in Colorado in 1876 and two years later to the State senate, serving as a Republican. He was a railway attorney from 1879 to 1884 and was a member of the United States Senate from 1889 to 1901. During the campaign of 1896 he advocated bimetallism, but supported the Republican candidate for President, and was appointed a commissioner to Europe to report on international bimetallism. In 1903 he was a candidate for the United States Senate, but was defeated by his opponent, Henry M. Teller.

WOLCOTT, John, painter and satirist, known quite generally by his pseudonym, *Peter Pindar,* born at Dodbroke, England, May 1, 1738; died in London, Jan. 14, 1819. He studied at the Kingsbridge free schools and afterward took a course of instruction in France, where he acquired the use of the French and became versed in Greek and Latin. In 1756 he published his first writing in *Martin's Magazine.* His satires were widely read, especially those relating to George III., entitled "Royal Visitor to Exeter" and "Peeps at Saint James." Other writings include "An Epistle to James Boswell," "Complimentary Epistle to James Bruce," and "Lyric Odes to Academicians." His paintings include a number of fine productions and he published, in 1797, "Six Picturesque Views from Paintings by Peter Pindar."

WOLCOTT, Roger, Governor of Connecticut, born in Windsor, Conn., Jan. 4, 1679; died in East Windsor, May 17, 1767. He was apprenticed to a weaver when twelve years of age and in 1700 established an independent business. In 1709 he was made a representative and two years later accompanied an expedition into Canada. He served successively as a member of the council, was judge of the county court and of the supreme court, held the office of deputy governor, and in 1741 became major general of Connecticut forces. In 1745 he commanded at the siege of Louisburg and was Governor of Connecticut from 1750 to 1754. He published several poetical and historical works. His son, Oliver Wolcott (1726-1797), commanded a brigade under general Gates at Saratoga, was a member of Congress from 1784 to 1785, and became Governor of Connecticut in 1796. His grandson, Oliver Wolcott (1760-1833), was eminent as a public man. He was comptroller of the currency from 1788 to 1789, auditor of the United States treasury from 1789 until 1791, and in 1795 succeeded Alexander Hamilton as Secretary of the Treasury. From 1801 to 1802 he was a United States circuit judge and from 1817 to 1827 served as Governor of Connecticut.

WOLF, a quadruped of the genus *Canis.* It is closely allied to the dog, of which it is thought to be the progenitor. A number of species have been enumerated, but the mammals generally classed as wolves are all native to the Northern Hemisphere. The possible exceptions are the Aguana wolves of South America, which are allied to the prairie wolves, and the Tasmanian wolf, a marsupial. The *gray wolf,* which is gray above and yellowish-gray below, is the most familiar species of North America. It is three to four feet long, has a somewhat bushy tail and pointed ears, and formerly roamed in packs in New England and westward. Other American species include the

dusky wolf of the Northwestern States, the *rufous wolf* and the *black wolf* of the Southern States, and the *prairie wolf,* or *coyote,* of the plains of Canada and the United States. The



COMMON WOLF.

last named is a burrowing animal and more nearly resembles the jackal than the wolf.

All the species of wolves are carniverous, pursuing their prey with much swiftness and rapacity. They are the particular dread of shepherds, whose flocks they attack. They prey upon calves, deer, and elks and some species even attack man when they are hungry. Large numbers of wolves are found in many parts of Europe, especially in the more isolated sections of Russia, Spain, Turkey, France, Germany, and Italy. The *common wolf* of Europe gathers in packs on the northern plains of Russia, where it is dreaded as an enemy to man and domestic animals, often pursuing travelers and visiting barnyards. In Southern Europe they find a refuge in the forests and snowy slopes of the Alps, Pyrenees, and other mountains. The true wolf has a dismal howl, which it issues when in packs, but some species have a snapping bark. All the species are crafty and cunning in searching for food and protecting their young.

WOLF, Christian von, philosopher, born in Breslau, Germany, Jan. 24, 1679; died April 9, 1754. In 1703 he graduated from the University of Leipsic, where he became a lecturer, but subsequently was made professor of sciences at Halle. He was temporarily suspended on a charge of heterodoxy, but was reinstated in 1740 at the instance of Frederick the Great. In 1743 he became chancellor of the university and two years later was created a baron for efficient services in educational work. His philosophy was generally accepted until the time of Kant. His writings were published in Latin and German. They include "Empirical Psychology," "General Cosmology," "Practical Universal Philosophy," and "Moral Philosophy."

WOLFE (wo͝olf), **Charles,** poet and clergyman, born in Dublin, Ireland, Dec. 14, 1791; died in Cork, Feb. 21, 1823. He graduated from the University of Dublin, where he was a tutor for some time, but afterward became a clergyman in Tyrone County. After becoming afflicted with consumption, he went to Southern France in search of health, but soon returned to Ireland. His best known poem is "The Burial of Sir John Moore," which was written while he was still a student. A volume of his sermons and poems was published after his death under the title "Remains and Memoir."

WOLFE, James, military leader, born in Westerham, England, Jan. 2, 1727; died Sept. 13, 1759. He was commissioned as ensign in 1741 and embarked for Flanders, where he took part in several campaigns and was present at the Battle of Dettingen. In 1745 he took part in the suppression of a rebellion in Scotland, where he became distinguished in the battles of Falkirk and Culloden. Subsequently he served against the French at the Battle of Lawfeldt, was made major in 1749, and the following year became lieutenant colonel. He attracted the attention of Pitt in the expedition against Rocheford, in 1757, and in the following year was appointed to command a brigade in America. Cape Breton was the objective point of his military exploit. Afterward Wolfe urged an attack on Quebec, then strongly fortified and garrisoned, and he was made major general with orders to proceed in the plan of capturing it. In June, 1759, he appeared near the city with 8,000 men, where he was opposed by a powerful French army under Montcalm. All attempts to capture the city were resisted successfully by the French and the English began to grow discouraged, but in September Wolfe ascended to the Plains of Abraham, where he completely defeated the French and captured the city. Both Wolfe and Montcalm were slain in the battle. Monuments to commemorate these commanders were erected in Quebec. A monument also commemorates General Wolfe in Westminster Abbey.



JAMES WOLFE.

WOLF FISH, a fish found in the North Atlantic, so called from its voracious and carnivorous habits. It has a large mouth and strong teeth and bites savagely when caught

by fishermen. In some localities it injures the nets set for other fishes. The Icelanders catch it for food, using it both fresh and salted, and a kind of shagreen is made of the skin. The common wolf fish is from five to seven feet long, but reaches its largest form in the colder waters. Several species are caught off the shores of Norway and Great Britain.

WOLSELEY (wo͝ol'zĭ), **Sir Garnet Joseph,** military leader, born near Dublin, Ireland, June 4, 1833. He entered the British army in 1852 for service in the Burmese War, in which he was dangerously wounded. The following year he took part in the Crimean War, receiving severe wounds at Sebastopol, and from 1857 to 1858 commanded as major at Lucknow during the mutiny in India. He served as lieutenant colonel in the Chinese War of 1860 and as a colonel in the army of Canada from 1862 to 1870. From 1873 to 1874 he commanded as major general in the Ashantee War, and served in South Africa in 1879 and in the Egyptian campaigns of 1882. His army captured Arabi Pasha at Tel-el-Kebir, for which he received the thanks of Parliament and was made a general and baron. In 1890 he became commander in chief of the army in Ireland, and in 1895 attained to the chief command of the British army. He published "Life of John Churchill, Duke of Marlborough," "The Decline and Fall of Napoleon," "Field Book for Auxiliary Forces," and "Narrative of the War with China." He died Mar. 25, 1913.

WOLSEY (wo͝ol'zĭ), **Thomas,** bishop and cardinal, born in Ipswich, England, in 1471; died in London, Nov. 29, 1530. He was the son of a butcher, studied in his native town, and afterward took a course of instruction at Oxford University, where he received the degree of master of arts. Soon after he was appointed a teacher of the grammar school connected with the Magdalen College, Oxford, and later became rector at Lymington. He was appointed chaplain to Henry VII. through the recommendation of several friends, and on the accession of Henry VIII. became lord chancellor to that sovereign. He was made cardinal in 1515 and pope's legate in 1518. A great lover of display, he occupied the palace of Yorkplace, now Whitehall, freely expended his revenues, and was twice an unsuccessful candidate for the Papacy. Besides founding a college at Ipswich, he projected the College of Christ Church at Oxford and built the palace at Hampden Court.

The success of Wolsey was due largely to his learning, shrewdness, and pleasing manners. He gained much influence by the fact that he obtained several diplomatic victories which enabled Henry to maintain a balance of power between Charles V. and Francis I. However, he lost royal favor when he failed to secure the Pope's permission to a divorce of Henry from Queen Catharine. The failure was due to the opposition of Charles V., Emperor of Germany, who was the nephew of the queen. Wolsey was finally driven from court and his estates were confiscated. Soon after he retired to his diocese in York. His ability and affable manner won friends among the people and the king subsequently relented and restored him to some of his offices, but his enemies began to fear that he would again succeed to almost supreme power and had him arrested on a charge of high treason. Many years of toil and anxiety had shattered his health and the long trip in coaches to Leicester Abbey was too much for his constitution. He died the next morning after reaching his destination.

WOLVERHAMPTON (wo͝ol-vẽr-hămp'-tŭn), a city of England, in Staffordshire, twelve miles northwest of Birmingham. The surrounding region contains rich coal and iron mines. The city is the seat of important steel and iron works. It has railroad connections with many trade centers, pavements, gas and electric lighting, electric street railways, public baths, and several fine parks. The chief building of interest is the noted church of Saint Peter, which was built in 996. Other edifices include a number of schools, several public halls, a free library, and numerous churches. Among the manufactures are hardware, nails, locks, furniture, edged tools, tinware, japanned ware, and machinery. It has a large trade in cereals, merchandise, vegetables, and fruits. The city dates from the time of Ethelred II. and his sister, Wulfrune, founded a college and church here in 996. It was first called Wulfrune's Hampton, from which its present name was derived. Population, 1921, 95,333.

WOMAN'S CHRISTIAN TEMPERANCE UNION, a national organization of women in the United States, organized at Cleveland, Ohio, in 1874. It is the outgrowth of a crusade conducted by women to suppress the liquor traffic. The principal objects are to secure social reform and induce habits of temperance. It has 10,000 local unions, including a branch for children, and the total membership is given at over 600,000. It maintains departments under local, county, district, state, and national superintendents, and receives and disburses annually about $72,500 in its efforts to further progression and educational work. This society has been instrumental in securing laws which require teaching the effects of stimulants and narcotics on the human system in nearly all of the states. It has exercised a wide influence in obtaining better protection of girls and women, in the appointment of police matrons, and in establishing houses of refuge for erring women. Conventions are held annually by the national organization. Evanston, Ill., is the headquarters of the society and the *Union Signal,* published at Chicago, is the official organ.

Frances E. Willard, an influential member of this society, promoted the organization of the World's Christian Temperance Union, which was established in 1883. In this work she was ably assisted by Mary H. Hunt of Boston, Mass. Branch organizations are now maintained in most countries of the world. The international headquarters are at Rest Cottage, formerly the home of Miss Willard, at Evanston, Ill. The white ribbon is worn as the badge of these societies and the policy is declared to be "Do everything."

WOMAN'S RELIEF CORPS, a patriotic society of women, organized as an auxiliary to the Grand Army of the Republic in July, 1883. All loyal women are eligible to membership, but the organization is composed chiefly of mothers, wives, daughters, and sisters of soldiers who fought in the Federal army during the Civil War. The membership is about 151,500 and the society is divided into 35 departments and 3,150 corps. Meetings are held by loyal organizations in connection with the Grand Army. The purpose is to teach patriotism to the rising generation, to perpetuate the memory of Union soldiers, and to extend charities among the widows and orphans of veterans.

WOMAN'S RIGHTS, the term commonly applied to the claim that women should be placed as nearly as possible on an equality with men, legally, socially, and politically. An organized movement for general equality between the sexes began in the United States in 1848. The National Woman's Suffrage Association was organized in 1868. Susan B. Anthony was for many years an efficient promoter of this association and many eminent women have given it much time and attention. The object is to develop public sentiment in favor of woman suffrage in all the states of the Union. Other allied associations are widely organized and have the same or similar objects in view. Collectively they have exercised considerable influence in promoting the right of women to vote at special and general elections.

The questions involved in the movement to obtain greater rights for women in politics received early attention in New Zealand, Tasmania, and the several states of the Commonwealth of Australia, in which the right of suffrage is either wholly unrestricted by sex or is nearly equally extensive to males and females. Norway is one of the first countries of Europe to grant the free use of the ballot to both sexes. A campaign for the admission of women to the elections and to public offices was commenced in England in 1906. It reached a large place in the public mind as early as 1907, when many women were arrested for insisting upon being heard by the Parliament. The general tendency in Europe and America is to extend the rights of women, but in most cases either an educational or a property standard is required. See **Suffrage.**

WOMBAT (wŏm'băt), an Australian marsupial, which somewhat resembles a small bear in appearance. The legs are short and strong, the head is large and flat, the body is broad and depressed, and the tail is rudimentary. Several species are native to Southern Australia and Tasmania, but all are nocturnal in



WOMBAT.

their habits. The body is two to three feet long. They range in color from gray to brownish-black. The day is spent largely in sleep, but at night they come forth in search of food, which consists mostly of roots and other forms of vegetation. Three or four young are brought forth at a birth and are carried for some time in the marsupium or pouch. They are animals of little intelligence and are not harmful unless they are provoked. The flesh is highly esteemed for food, its flavor resembling that of pork.

WOMEN'S CLUBS, the general name applied to organizations promoted and maintained by women. The first clubs were formed with the view of promoting religious and charitable work among women, but an extension of facilities to educate women and train them for responsible duties in public life brought about a widespread desire to coöperate more closely along general lines. Organizations of this kind are now very general in Europe and America. They are either social or educational in character, and in some countries they have assumed a form of association to promote the extension of political influence. All the larger towns and cities of Great Britain, Germany, France, Canada, and the United States have numerous clubs to promote research in literature, arts, and social development. The General Federation of Women's Clubs was formed in 1892. In 1908 it had a membership of about 175,000 in the United States and other countries. This organization places a bar upon sectarian or political tests and confines its work to social, artistic, literary, and scientific cul-

ture. Women's clubs to further political measures are numerous in New Zealand, Australia, and some states of the United States where woman's suffrage has been adopted. Similar organizations were organized very generally in Great Britain in 1908, at the time when a great crusade was organized to promote the movement for extending the right to vote and hold office to women.

WOOD, Horatio Curtis, physician and author, born in Philadelphia, Pa., Jan. 13, 1841. He graduated from the University of Pennsylvania in 1862 and began the practice of medicine in Philadelphia. In 1866 he was chosen professor of botany in the University of Pennsylvania and ten years later was transferred to the chair of therapeutics. He edited at different times the *New Remedies, Medical Times,* and *Therapeutic Gazette.* His published works include "Materia Medica and Therapeutics," "Study in Morbid and Normal Physiology," and "Nervous Diseases and their Diagnosis." His uncle, George Bacon Wood (1797-1879), was a lecturer and writer of importance. He published "History of the University of Pennsylvania," "A Treatise on the Practice of Medicine," and "A Treatise on Therapeutics and Pharmacology."

WOOD, Leonard, soldier, born in Winchester, Vt., Oct. 9, 1860. He attended Pierce Academy at Middleboro, Mass., and graduated at Harvard Medical School in 1884. The following year he was attached to the regular army as surgeon. At the outbreak of the Spanish-American War he joined Theodore Roosevelt in organizing the Rough Riders, a regiment which did effective work at Las Guasimas, being under the command of Wood as colonel and Roosevelt as lieutenant colonel. He commanded a brigade in the Battle of San Juan Hill, became a brigadier general of volunteers in 1898, and was commissioned brigadier general in the regular army in 1901. In 1899 he was made military governor of Cuba, serving until 1902, when the United States turned the government over to the new republic. In 1906 he was made commander in the Philippines, and in 1917 he became commander in the South, with headquarters at Charleston, S. C.

WOOD ALCOHOL, or **Methyl Alcohol,** a liquid obtained by heating wood in closed retorts, under conditions that exclude the air. The product resulting from the process involved is a mixture of wood alcohol, ammonia, acetone, and other substances and acids. This mixture is neutralized with slaked lime to separate the acids, after which the wood alcohol is isolated by distillation. When in a pure state, wood alcohol is a colorless liquid, has a peculiar aromatic odor, and mixes readily with water in any proportion. It is used extensively in the manufacture of varnishes and to prepare methylated spirit. The latter is a mixture of ten parts of wood alcohol to ninety parts of ordinary alcohol. While it is cheaper than ordinary alcohol, it contains most of its properties and is used as a substitute for it.

WOODBERRY (wo͝od'bĕr-rĭ), **George Edward,** poet and educator, born in Beverly, Mass., May 12, 1855. He studied at Harvard, where he graduated in 1877, and the same year became professor of English in the University of Nebraska. In 1878 he joined the editorial staff of the New York *Nation,* but returned to the University of Nebraska after two years. In the meantime he contributed to many magazines and periodicals and in 1891 was made professor of comparative literature in Columbia University, which position he resigned in 1904. His books include "Life of Edgar Allen Poe," "History of Wood Engraving," "Studies in Letters and Life," "Makers of Literature," "Collected Poems," and "America in Literature."

WOODBINE (wo͝od'bīn), the name given in Europe to the honeysuckle, so called from its habit of clinging to and winding around trees. It is a woody climber with deciduous leaves. The fragrant yellow and red flowers are in terminal heads and are succeeded by red berries. This plant has been naturalized in Canada and the United States. The name woodbine is applied locally to several species of honeysuckles, especially to the *Virginia creeper* which see.

WOODBURY (wo͝od'bĕr-ĭ), **Levi,** jurist, born at Francestown, N. H., Dec. 22, 1789; died Sept. 4, 1851. He graduated at Dartmouth College in 1809, was admitted to the bar, and established a successful practice in his native town. In 1823 he was elected Governor of his State as a Democrat and the following year became a member of the State Legislature. Soon after he was chosen a member of the United States Senate, where he supported the policies of Andrew Jackson. The latter appointed him Secretary of the Navy in 1831 and three years later made him Secretary of the Treasury. He remained in the treasury until the close of Van Buren's administration, in 1841, when he was again elected to the Senate of the United States. In 1845 he succeeded Joseph Story as a judge of the United States Supreme Court.

WOOD CARVING, the art of carving wood into ornamental figures, or decorating it by carvings. The art is one of the oldest and long held an important position among the plastic arts. Specimens of wood carving dating from the early period of the Egyptians and Greeks have been preserved in many parts of Europe, Asia, and North Africa. The most noted is a life-size statue dating from about 4000 B. C., which was secured from the ruins of Egypt and is now in the Boulak Museum. It is carved from sycamore wood, all parts being in the solid except the right arm, which

is attached by a mortise and tenon. Other specimens of carving, such as furniture, toilet articles, surface reliefs of plants and animals, and coffin ornamentations, have been obtained from the Egyptian tombs. Though the Greeks and Romans excelled in wood carving, only a few specimens have come down in a preserved state.

In the Middle Ages, fine wood carvings were made to decorate the doorways and altars of churches and many church ornamentations, such as crucifixes. Some of the finest specimens of doorway decorations are to be found in the Scandinavian countries, while exquisite altar decorations in carvings of wood exist in Germany and Spain. The carvings made in England in the Middle Ages were destroyed largely during the Reformation, but there are newer specimens at Westminster Hall, Saint Paul's Cathedral, and Cambridge. Wood carving as an art was not confined to Europe in modern times, but there are many fine specimens made by the Mohammedans in Damascus, Constantinople, and Cairo. Other fine products of this kind were made by the Hindus, many of which are seen in the temples of India, and by the Chinese and Japanese. The modern wood carvings of China and Japan are counted the finest in the world. Many savage races are skillful in carving, especially the Polynesians, who decorate their canoes, paddles, and huts with finely designed figures. The Eskimos are quite skilled in various kinds of carving, especially in making totem posts.

WOODCHUCK (wo͝od'chŭk), an animal of the marmot family, which is native to the eastern part of North America, ranging from Alabama to Hudson Bay. The color is blackish above and chestnut-red below. The body is fourteen to eighteen inches long and the tail is bushy. Woodchucks are vegetable feeders, subsisting mostly on plants and fruits, and dig burrows in the ground surrounded at the upper part by a ridge so water cannot enter. They may be easily tamed and in a domestic state feed on bread and vegetables. In some sections they prove a pest to farmers in that they burrow on hillsides and destroy clover fields. The flesh is quite rank, but is eaten in some localities. The woodchuck is popularly called *ground hog*. It was formerly supposed that if the sun shines on Feb. 2, or Candlemas Day, so the ground hog may view its shadow, it returns to its burrow and sleeps for six weeks, but, if cloudy weather on that day prevents it from seeing the shadow, it becomes assured that spring is at hand and remains active. Hence, Feb. 2 has come to be called Ground Hog's Day.



WOODCHUCK.

WOODCOCK (wo͝od'kŏk), the name of several birds commonly classed in the same genus as the snipes, but they have a more bulky body and shorter and stronger legs than the true snipes. The *American woodcock* is about eleven inches long, with an alar extent of eighteen inches. It has a short tail and is of a yellowish-brown color shaded with black. The woodcock frequents fresh-water swamps, where it searches in the water for insects and worms, but its shy habits incline it to spend most of the time during the day in rushes and woods. The flesh is considered a delicacy for the table. These birds have the peculiar habit of occasionally conveying their young through the air, a trait found only in one or two other birds. This is done by the young bird being gently pressed between the feet and against the breast of the parent bird, though sometimes the bill is used to assist in holding the fledgling. Several species of woodcock are native to the Old World. The *common European woodcock* is somewhat larger than the American. The female measures about thirteen inches in length and is somewhat larger than the male.

WOOD ENGRAVING, the art of cutting figures or patterns on wood, which has long been one of the useful arts. It must be borne in mind that there is an important difference between wood engraving and plate or steel engraving, in that the former has the parts intended to print on the paper in relief, thus resembling ordinary printing type, while the designs in the steel engraving are sunk into the surface. It is not difficult to understand why wood engraving should be the oldest method of making illustrations, since there is but a small step between the ordinary block and the engraved cut, both making an impression on the paper by means of ink. It is thought that block cutting and wood engraving originated in China and that they date practically from the same period. In making wood engravings it is necessary to use a hard and fine-grained wood, Turkish boxwood being the best. The wood is dried thoroughly and cut across the grain, but in large engravings several blocks are joined together. In thickness the block is equal to the length of a printer's type, thus making the engraving fit exactly to the ordinary type used in a printing press. The first step in engraving is for the artist to draw the picture by means of a pencil or brush, which is usually done after a thin coating of white has been applied to the



(Opp. 3179)

BIRDS CLASSED AS CLIMBERS.

Upper View—Mexican Woodpecker.
Lower View—Gila Woodpecker.

surface, and the block is then turned over to the engraver. The tools employed by an engraver are made of the finest steel, thus making it possible to maintain sharp edges, a condition essential in producing high-class work. Large engravings are usually in several blocks, each of which is turned over to a special artist, and after the engraving has been completed they are fastened together and used as a single block.

The Chinese are thought to have produced wood engravings ten centuries before the Christian era, but the oldest work of this kind now in Europe dates from 1418. It is preserved in the library at Brussels and represents the Virgin and Jesus surrounded by four saints. Other specimens made in the 15th century are to be seen in Amsterdam, Paris, and Nuremberg. Albrecht Dürer of Nuremberg made many improvements in engraving on wood in the early part of the 16th century, and it is through him that the publication of illustrated books became general in Germany before they were common in other European countries. The finest drawing and engraving are still done in Germany, where many artists find employment in engraving on wood. Besides supplying excellent means of illustrating books and periodicals, there is the additional advantage in wood engravings that they can be duplicated with good results by electrotype and stereotype processes. Within recent years there has been a remarkable tendency to adopt photo-mechanical processes in the preparation of illustrations for books and periodicals, such as the half-tone process. See **Engraving.**

WOODPECKER (wo͝od-pĕk′ẽr), a genus of birds belonging to the climbers, so called from their habit of pecking into trees in search of insects. The body is quite slender, the beak is long and powerful, the tongue is pointed, and the tail is stiff. About 350 species have been described, of which about half are found in the New World. These birds are skilled in discovering the holes of insects in trees, at which they peck with sufficient perseverance to make an opening large enough to secure the object sought. The tapping frequently is so vigorous that the noise may be heard at some distance. They commonly cut large holes into partially decayed trees to form nests, in which the female lays from four to six eggs, and in some cases make openings through the outer boards of buildings for the same purpose.

Nearly all the woodpeckers are birds of beautiful plumage, usually having bright markings of red, white, yellow, or green at the head and wings. The red-headed, hairy, three-toed, black, ivory-billed, golden-winged, and yellow woodpeckers are species native to North America. They differ materially in size and habits. The *ivory-billed woodpecker* is a southern bird. It is twenty inches long, with an alar extent of thirty inches. The *red-headed woodpecker* is found in North America from the Atlantic to the Rocky Mountains. It is ten inches long and has a crimson-colored head. The *California woodpecker* is common to the Pacific coast and is noted for feeding



RED-HEADED WOODPECKER.

chiefly on acorns, which it stores as food in the hollows of old trees. Among the species native to Europe are the *great spotted woodpecker* and the *green woodpeck.* The Asiatic *hornbill* is an allied species of these birds.

WOOD PEWEE (pē′wē), the name of a small bird belonging to the fly-catchers, found on the Atlantic coast from Nova Scotia to the Gulf of Mexico. It has a rapid flight, moving about with sudden darts, especially when in pursuit of insects. The expanse of its wings is from ten to twelve inches. It has a grayish band across the wings, is greenish-yellow below, and utters a slow and somewhat plaintive note, which resembles the sound of *pee-a-way.* The eggs number four or five, have a light yellowish color, and are characterized by spots at the larger end. This bird migrates toward the south in autumn, usually as far as the West Indies and Central America.

WOODRUFF, Wilford, fourth president of the Mormons, born in Avon, Conn., March 1, 1807; died in San Francisco, Sept. 1, 1898. He was educated at the Farmington Academy and in 1833 was ordained a minister in the Mormon Church. In 1839 he became one of the twelve apostles of the church and ten years later accompanied Brigham Young to Utah, where he became noted as an able and active

preacher. He succeeded to the presidency in 1877, largely because of his great enthusiasm in disseminating the tenets of his church, and administered the office with marked ability and liberality. For 22 years he was a member of the Utah legislative assembly. Though an early defender of the system of polygamy, he announced, in 1890, that the voice of God had commanded the abolition of the practice. Woodruff was not only popular among his people, but his sincerity in support of Mormonism was not doubted by the adherents of other sects. He served on the editorial staff of the *Times and Seasons* and the *Millennial Star.* He was succeeded in the office of president by Lorenzo Snow in 1898. The latter was born at Mantua, Ohio, April 3, 1815, and graduated with high honors from Oberlin College. He died on Oct. 10, 1901.

WOODSTOCK (wo͝od'stŏk), a city of Ontario, county seat of Oxford County, on the Grand Trunk and Canadian Pacific railways. It occupies a fine site on the Thames River, at the point where it receives Cedar Creek, about thirty miles northeast of London. The chief buildings include the county courthouse, the public library, the Oxford Hotel, the Woodstock College, and a number of fine schools and churches. It has manufactures of woolen goods, flour, leather, furniture, and machinery. The public utilities include electric lighting, waterworks, and sewerage. It has a growing trade in farm produce and merchandise. Population, 1901, 8,833; in 1921, 9,935.

WOODWARD (wo͝od'wĕrd), **Calvin Milton,** educator, born in Fitchburg, Mass., Aug. 25, 1837. He graduated at Harvard University in 1860 and immediately became principal of the Brown high school, Newburyport, Mass., serving until 1865. In the latter year he was elected to a professorship at Washington University, Saint Louis, that of mathematics and applied mechanics, and in 1870 became dean of the school of engineering. He was one of the organizers of the Saint Louis Manual Training School and for some years served as regent of the Missouri State University, of which he became president in 1904. He published "Manual Training and Education," "History of the Saint Louis Bridge," and "The Manual Training School."



CALVIN M. WOODWARD.

WOODWARD, Robert Simpson, educator, born in Rochester, Mich., July 21, 1849. In 1872 he graduated at the University of Michigan and became assistant engineer on the lake survey of the United States. He was assistant astronomer from 1882 to 1884, serving at the station in San Antonio, Tex., and later was astronomer to the United States geological survey. He was made professor of mechanics at Columbia University in 1893, later was chosen professor of mathematical physics, and in 1895 became dean of the faculty of pure science. In 1905 he was elected president of the Carnegie Institution, Washington, D. C. Among his publications are many memoirs and papers. He is the author of a text-book for classical and engineering colleges entitled "Higher Mathematics."

WOOL, the soft and curly hair obtained from sheep and some allied animals, used chiefly in the manufacture of clothing. The most noticeable difference between wool proper and hair is in the circumstance that the former is crisped or curly and has minute scales, while hair is usually smooth and straight. When examined under the microscope, it is noticed that the scales extend outward wherever a bend occurs in the fiber, but overlap each other when the fiber is straightened. It is due to this property that woolen threads are inclined to hold together or felt, while the wavy or curly form of the fibers prevents spun threads from untwisting, as is the case with smooth hair. Wool is generally divided into the two classes which are known as *short* or *carding wool* and *long* or *combing wool.* Carding wool is three to four inches long and combing wool is from four to eight inches. The value depends upon the degree of fineness and softness, but a considerable length is deemed essential to bring the highest market price. Spain has long produced the finest grade of carding wools, owing to its climate being particularly favorable to the merino sheep, but large flocks of merinos are now bred in Germany, Australia, America, and South Africa.

Wool Industry. Wool growing is an extensive industry in Canada and the United States. The latest estimates place the number of sheep in Canada at 2,685,000 and in the United States at 56,184,500. At present the annual clip of wool in the United States aggregates 300,-550,000 pounds. This immense quantity of wool is not sufficient to supply the demand, hence about 142,500,000 pounds are imported annually, though the importations are mostly fancy grades. The total wool production of the world is placed at 2,910,104,500 pounds. Wool is supplied by the Rocky Mountain, Angora, and Cashmere goats. The beaver and some other animals have a growth of wool under the hair. Wool ranks next to cotton in the quantity consumed as a material for making clothing. It is shorn off the sheep and goats at different seasons of the year, this depending on climatic conditions, but generally the clippings are made in the spring.

In most countries the sheep are washed in a large bath or tank before being sheared, thus removing a part of the dirt from the wool. After shearing, the wool is separated into different grades, depending on the softness and length, and is then carefully washed and dried.

In most cases the washing and cleansing is done at the factory, where suitable machines are employed for the different processes. Some wool is dyed immediately after cleaning, while in other cases it is manufactured into cloth and left undyed, as some flannels, or it is dyed in the piece. Wool is subjected to many processes before it is spun into threads, including dusting, scouring, and picking to remove the burs which still cling to it. It is then passed through the carding machines, by which it is further cleaned and formed into untwisted yarn, somewhat larger in size than ordinary yarn, after which it is placed on spools. When in this condition it is ready to be spun into a fine, firm thread for weaving. The cloth is scoured shortly after weaving to remove the oil and dirt still remaining, when it undergoes the fulling process, by which it is shrunk to form a more compact body. In fulling, the cloth loses ten to twenty per cent. of its width and length, but becomes much thicker.

The cloth is usually passed over frames in the burling room to remove broken threads and some cloths undergo teaseling, by which fine threads are raised on the surface and, after cutting them, they form the *nap*, the inclined and projecting fibers of thread on the surface, as in flannel, hats, and various fabrics. The finished cloth is usually made into fifty-yard bundles, in which form it comes through the wholesaler to the retailer. The many kinds of woolen goods are divided into *broadcloths,* so called because they range in width from 56 to 60 inches, and *narrow cloths.* Beavers, cloakings, and meltons are among the broadcloths, while flannels, cashmeres, upholstery goods, doeskins, and blankets are included among the narrow cloths and are usually about 27 inches wide. Many manufacturers produce various kinds of woolens and make a difference in the material used. Thus, some goods are made entirely of wool, while others are partly of wool, containing either cotton, linen, or silk, or they may be made of a mixture of the different kinds of materials. Worsted goods are so named from being first manufactured in Worsted, England, and differ from other woolens in being made of a harder spun and stronger yarn. Formerly the spinning and weaving of woolens were slow processes, but with the improved machinery now in use it is possible for one man to do ten to fifteen times the work accomplished by a laborer of a hundred years ago. Australia is the greatest wool-producing country in the world and next to it rank Argentina, the United States, Russia, Great Britain, France, Spain, Uruguay, India, South Africa, Austria, Germany, and Turkey. However, the manufactures of woolen products are differently distributed, being largest in the United States, Germany, and Great Britain.

WOOL, John Ellis, soldier, born at Newburg, N. Y., Feb. 20, 1784; died Nov. 10, 1869. He studied law and engaged in the book business in Troy, but entered the army in 1812. Gallant services at Queenston Heights caused him to be promoted to the rank of major. In 1816 he was made a colonel, which position he retained until 1841, when he was appointed brigadier general. During the Mexican War he fought under General Taylor, whom he succeeded in command of the army, when the latter returned to the United States. At the beginning of the Civil War he was placed in command at Fortress Monroe and in 1862 he occupied Norfolk and Portsmouth. He continued in active service until 1863, when he was retired with the rank of major general.

WOOLSEY (wo͝ol'sĭ), **Theodore Dwight,** educator and author, born in New York City, Oct. 31, 1801; died in New Haven, Conn., July 1, 1889. He graduated from Yale in 1820, studied law in Philadelphia, and afterward took a course in theology at Princeton. After serving as tutor at Yale for two years, he studied three years in the German universities of Bonn, Leipsic, and Berlin. In 1831 he became professor of Greek in Yale University, where he labored successfully for fifteen years, and in 1846 was chosen president of that institution. He held that office for 26 years and in the meantime greatly improved its courses and enlarged the influence of the university. From 1871 to 1881 he was president of the American committee that aided in revising the New Testament. He was the founder of the *New Englander* and published works entitled "Political Science," "Study of International Law," "Communism and Socialism in Their History and Theory," and "Helpful Thoughts for Young Men." Series of articles written by him were published in the *New American,* the *Princeton Review,* and the *Century.*

WOOLWICH (wo͝ol'ĭch), a borough of London, England, formerly a town in Kent County, nine miles east of Saint Paul's Cathedral. It extends along the Thames River for three miles and has mostly narrow and irregular streets. The borough has extensive railroad facilities and steamboat connections with other trade centers, but its chief importance is due to the arsenal, which covers about 600 acres and includes barracks, gun factories, and ordnance departments. It is the seat of the Royal Military Academy and has extensive docks. About 10,000 men are employed at the arsenal. On the opposite side of the Thames is North Woolwich, which has extensive manufacturing establishments, especially of telegraph cables and earthenware. Population, 1921, 121,403.

WOONSOCKET (wo͞on-sŏk'ĕt), a city of Rhode Island, in Providence County, on the Blackstone River, forty miles southwest of Boston, Mass. It is on the New York, New Haven and Hartford Railroad and on several electric railways. The noteworthy features include the Harris Institute Library, the public high school, the Sacred Heart College, the

soldiers' monument, and three parks. It has manufactures of cotton and woolen textiles, rubber goods, hardware, musical instruments, machinery, and farming implements. Gas and electric lighting, street pavements, and sanitary sewerage are among the improvements. Near the city is Woonsocket Hill, an elevation 580 feet above sea level, which is the highest point in the State. The place was incorporated as a city in 1888. Population, 1920, 43,496.

WOOSTER (wo͝os'tẹr), a city in Ohio, county seat of Wayne County, fifty miles southwest of Cleveland, on the Pennsylvania and the Baltimore and Ohio railroads. The surrounding country has productive limestone quarries and bituminous coal mines. Among the noteworthy buildings are the county courthouse, the high school, the public library, the University of Wooster, and the Ohio Agricultural Experiment Station. It has manufactures of furniture, engines, paints and varnish, farming implements, and machinery. The place was platted in 1808 and named in honor of General Wooster. It was incorporated in 1868. Population, 1900, 6,063.; in 1920, 8,204.

WOOSTER (wo͝os'tẽr), **David,** soldier, born in Stratford, Conn., March 2, 1710; died May 2, 1777. He graduated from Yale in 1738 and the following year entered the army with the rank of lieutenant. In 1745 he commanded the *Connecticut,* a vessel conveying the troops to the siege of Louisburg. He served as brigadier general in the French and Indian War and in 1775 aided in capturing Ticonderoga. Subsequently he commanded a brigade in the continental army, served on an expedition in Canada, and after the death of General Montgomery had chief command. In 1777 he was appointed brigadier general of the militia and commanded at Danbury. While defending that town against the English under Gov. William Tryon, on April 26, 1777, he rallied his men, exclaiming, "Come on, my boys! Never mind such random shots," but was severely wounded and died shortly after. In Danbury is a fine monument of Portland granite, which was erected to his memory in 1854.

WORCESTER (wo͝os'tẽr), a city of Massachusetts, one of the county seats of Worcester County, 43 miles west of Boston, on the Boston and Maine, the Boston and Albany, and the New York, New Haven and Hartford railroads. Interurban electric railways furnish communication with Boston and many other cities. It is conveniently situated on the Blackstone River and is surrounded by a fertile farming country. The streets are handsomely paved and otherwise improved by waterworks, public parks, gas and electric lighting, and an extensive system of street railways. Among the chief buildings are the State normal school, the Clark University, the Worcester Polytechnic Institute, the Baptist Academy, the Odd Fellows' Home, the College of the Holy Cross, the Highland Military Academy, the public library with 140,000 volumes, the United States post office, and many fine public schools and churches. It is the seat of two State lunatic asylums, an industrial school, a military institute, and many hospitals and charitable institutions.

Worcester is important as an industrial and wholesaling center. It has one of the largest wire factories in the world. Among the general manufactures are boots and shoes, yarn, cotton and woolen fabrics, clothing, ironware, belting, wire, furniture, needles, flour, and machinery. Many tourists visit the city. It has fine resorts, both within the city and in the vicinity, including those at Mount Wachusett and at Lake Quinsigamond. The place was first settled in 1673, but the settlement was abandoned at the beginning of King Philip's War, and a permanent settlement was established in 1713. It was incorporated as a town in 1722 and was made a city in 1848. Population, 1905, 127,763; in 1920, 179,754.

WORCESTER, a city of England, in Worcestershire, 110 miles northwest of London. It is conveniently located on the Severn and has good railroad facilities. The chief building is its cathedral, founded by Archbishop Theodore in 673, but subsequent additions and modifications have been made at different times. Other noteworthy buildings include the corn exchange, the shire hall, the museum of natural history, and several schools and churches. Worcester is noted for its extensive manufacture of leather gloves. It has manufactories producing carriages, porcelain goods, textiles, spirituous liquors, engines, and machinery. Worcester was founded by the ancient Britons and was rebuilt in 894, after being destroyed by the Danes. In 1651 it was the scene of a noted battle, in which Cromwell routed the royalists under Charles II. Population, 1921, 47,987.

WORCESTER, Joseph Emerson, author, born in Bedford, N. H., Aug. 24, 1784; died in Cambridge, Mass., Oct. 27, 1865. After graduating at Yale University, in 1811, he became a public school teacher at Salem. In 1819 he settled at Cambridge, where he devoted himself to literature. He visited Europe in 1830 to consult some of the famous libraries with the view of publishing a comprehensive dictionary and in 1850 completed the well-known *Worcester's Dictionary of the English Language.* Subsequently this work was greatly enlarged. It is still a standard in many schools and institutions of higher learning. In its present form it constitutes one of the most complete works of its kind ever published. Worcester lectured extensively, published a number of geographies and histories, and contributed to many standard periodicals. He was granted a degree by Brown University in 1847 and by Dartmouth in 1856. His publications include "Elements of Geography, Ancient and Modern," "Epitome of History," "Outlines of Scripture Geography," and "Sketches of the Earth and Its Inhabitants."

WORDEN, John Lorimer, naval officer, born in Westchester County, New York, March 12, 1818; died in 1897. He joined the navy as midshipman in 1834, was commissioned a lieutenant in 1846, and commanded the *Monitor* in the fight against the *Merrimac,* or *Virginia,* on Hampton Roads in 1862. During the engagement his sight was injured by a shell, but he was on duty at New York and in the Pacific squadron until after the war, when he was promoted to the rank of commodore. In 1870 he was made superintendent of the Naval Academy at Annapolis, Md., and two years later was commissioned rear admiral. He commanded the European squadron from 1875 until 1877 and retired in 1886 at his own request.

WORDSWORTH (wûrdz'wûrth), **William,** eminent poet, born at Cockermouth, England, April 7, 1770; died April 23, 1850. His father was an attorney at law and provided for his elementary education at Hawkshead. In 1791 he graduated from Cambridge University and shortly after made an extensive tour of France. While there he studied the French language and sympathized with the revolutionists, but returned to England after remaining abroad a year. In 1793 he published two poems entitled "Descriptive Sketches" and "An Evening Walk." Raisley Calvert left him a legacy of $4,500, a sum deemed of much value at that period of his life, and he was requested by his benefactor to engage in literary work. He settled with his sister in Somersetshire, where he was visited by Coleridge in 1797. The two became close friends, and, with the object of securing the funds to make a tour of Germany, they formed a partnership to publish a volume of poetry under the title "Lyrical Ballads." Coleridge contributed "The Ancient Mariner" to this little volume, while Wordsworth supplied the other pieces, but the latter was censured considerably for using commonplace terms. His contributions to this work included, besides a number of others, "Lines on Tintern Abbey" and "We are Seven."

After returning from Germany, Wordsworth and his sister settled at Grasmere, in the lake district. Coleridge and Southey resided near them and the three came to be spoken of as the Lake School Poets. Not disheartened by the unappreciative reception of his former works, Wordsworth devoted himself with great energy to embody his peculiar views of poetry. In 1802 he received $42,000 on a debt due to his father at the time of his death and in the same year married his cousin, Mary Hutchinson. He was appointed inspector of stamps in 1813 and shortly after made several tours into Scotland and on the continent. Oxford University bestowed a degree upon him in 1839 and on the death of Southey, in 1843, he was made poet laureate. Although his writings were adversely criticised for many years, he has come to be regarded among the greatest poets of England. His numerous works include "The Female Vagrant," "The Last of the Flock," "Lines to Westminster Bridge," "To a Highland Girl," "Excursion," "Ode on the Intimations of Immortality," "The River Duddon," "White Doe of Rylstone," "Song at the Feast of Brougham Castle," "The Prelude," "Yarrow Revisited," "The Borderers," and "Memorials of a Tour on the Continent."

WORKHOUSE, an establishment maintained for paupers, in which minor offenders are detained for a short time. The term applies in England to houses of correction that are maintained by the authorities to segregate paupers from others, and here they are required to work as a means of reform or as a punishment for some minor offense. In the United States the name is sometimes applied to places where vagrants and drunkards are confined at work, but such establishments are more generally spoken of as *houses of correction.* Workhouses have been a prolific means of suppressing vagrancy in England, especially under a general act of Parliament passed in 1782, which induced a dread that stimulated the poor to provide for themselves. Such establishments usually give secular and religious instruction and enforce the habits of cleanliness and industry. Those who are confined to the workhouse are usually unable to pay a nominal fine, and the expense of keeping them is at least partly compensated for by the labor they are required to do in confinement.

WORLD'S COLUMBIAN EXPOSITION, the official name of an international exhibition held in Chicago, Ill., in 1893, to commemorate the discovery of America by Columbus in 1492. The idea of holding such an exposition was suggested by Alexander D. Anderson, secretary of the board of trade at Washington, D. C., who published his approval of the enterprise as early as 1884. Subsequently he was joined by others in a movement to secure the recommendation of Congress favorable to such a celebration. At the instance of Senator Hoar the Library Committee of the United States Senate recommended the promotion of the enterprise. In 1890 Senator Cullom of Illinois introduced a bill favorable to the holding of the World's Columbian Exposition in the year 1892, which bill was soon after passed by both houses of Congress. The city council of Chicago had already authorized Mayor Cregier to appoint a committee of one hundred citizens, of which Lyman J. Gage was made chairman, the object being to promote interest in the exposition and to urge the claims of Chicago to its being made the site. Other cities, including New York, Washington, and Saint Louis, entered into the competition, but the exposition was awarded to Chicago, which city was designated the seat of the same by an act of Congress.

The site of the exposition comprised 666 acres. It was mainly in Jackson Park, a fine tract of land on the shore of Lake Michigan, situated

about six miles south of the mouth of the Chicago River, now the Chicago Drainage Canal. To it was added a boulevard connecting Washington and Jackson parks, which was 600 feet wide and was known as the Midway Plaisance. It required about two years to improve the grounds and construct the buildings, which were among the finest and certainly the most elaborate of their kind ever erected in the world. The many beautiful structures resembling marble in appearance caused the grounds to be called the *White City*. However, it was necessary to postpone the celebration until 1893 and on May 1 of that year the opening ceremonies took place. Grover Cleveland, President of the United States, delivered the dedicatory address and touched the electric button that set all the machinery in motion. The chief officers were George R. Davis, director-general; Thos. W. Palmer, president of the national commission; and H. N. Higginbotham, president of the Columbian Exposition Company.

The grand court of the exposition presented the finest aspect ever witnessed in America. It was beautified with exquisite architecture, sparkling fountains, extensive canals and lagoons, and masterful works of sculptured art. The building devoted to manufactures and liberal arts was the most extensive, covering an area of about forty acres. In it were exhibited the products of the skill and ingenuity of all the nations and peoples of the world. Other structures worthy of special mention included those containing the exhibits classed as representing mines and mining, electricity, horticulture, agriculture, live stock, machinery, fisheries, forestry, etc. The states and territories made elaborate displays, for which purpose many of them expended large sums of money. Those appropriating $200,000 or more for that purpose are Illinois, $800,000; New York, $600,000; California, $550,000; Pennsylvania, $360,000; Michigan, $275,000; Wisconsin, $212,000; and Ohio, $200,000. Forty-one nations and colonies were represented at the exposition, which included all the civilized peoples and many of the barbarian. Foremost among those making elaborate displays were Canada, Germany, France, Mexico, Russia, Spain, Great Britain, and Italy.

The total assets of the World's Columbian Exposition were officially reported at $28,151,168.75 and the total attendance was placed at 27,539,021, the latter number including free admissions. In October the receipts were $3,195,670 and the attendance in the same month was 7,945,430, this being the best record for any one month. Chicago Day witnessed the largest attendance, the number being 716,881. It was estimated that 11,250,000 different persons attended the exposition from its opening until it closed on October 30, 1893. While the receipts for all purposes were about equal to the expenditures, the income from concessions and gate receipts was $14,117,332. See **Exposition.**

WORMS (vōrms), a city of Germany, in the grand-duchy of Hesse, on the Rhine River. It is one of the oldest cities in Germany and its history is of much interest. The general aspects have been changed materially within recent years, owing to the construction of a number of important railway lines and the addition of many modern facilities. The streets are paved substantially and are improved by drainage, waterworks, gas and electric lighting, and an extensive system of rapid transit. It has manufactures of pottery, musical instruments, polished leather, tobacco products, wines, and machinery. Among the interesting buildings is a cathedral in the Byzantine style, dating from the 8th century. The Liebfrauenkirche is a beautiful church. It has a number of fine schools, a gymnasium, the town house, and the Saint Martin Church. Worms is connected with many of the incidents mentioned in the Nibelungenlied. During the Roman occupation it was an important military point. Attila destroyed it, but it was rebuilt by Clovis and was long a residence of Charlemagne. Henry V. made it a free imperial city. Several important diets convened at Worms, at one of which Luther appeared in defense of the Protestant faith before Charles V. and the imperial princes. This event is commemorated by an imposing monument to Luther, unveiled in 1868. The city suffered greatly in the Thirty Years' War, but within recent years has shown evidences of returning importance. Population, 1915, 43,841.

WORMS, or **Vermes,** the lowest class of articulated animals, which are characterized by elongate, flattened, or cylinderical bodies. The name is loosely applied to a large number of forms that do not have many features in common, but some writers restrict the group to those that have a digestive tract with two openings, the mouth and the anus, and which have a blood-vascular circulatory system. In most forms the nervous system has a principal center above the throat, the body cavity is present, and the excretory organs are simple. The name worms is applied to many entozoa that are found in the intestines of the human body. These animal forms may occur at any period of life, but are most frequent in young children.

WORMWOOD (wûrm'wo͝od), a class of plants, which have an erect, angular, and shrubby stem and yellowish flowers. A number of widely diffused species have been catalogued, of which the *common wormwood* of Europe is the best known. This plant is now naturalized in Canada and the eastern part of the United States. Its leaves are aromatic and yield a bitter tonic employed as a vermifuge and to protect clothing and furniture from moths and other insects. The *Roman wormwood* is native to Germany and has properties similar to those of the common wormwood. A tall greenhouse annual known as *wild wormwood* is native to the West Indies and is allied to the feverfew.

WORSTED (wŭst′ĕd), the name applied to several varieties of woolen yarn or thread, so named from Worsted, England, where it was first manufactured. A fine and soft worsted woolen yarn, untwisted or lightly twisted, is used in knitting and embroidery. Long staple wool is employed to spin a well-twisted worsted yarn. This product is used in making gloves, carpets, hosiery, and cloth. Worsted goods of this class are produced largely from wool that has been combed carefully so that fibers lay parallel to each other.

WORTH, William Jenkins, soldier, born in Hudson, N. Y., March 1, 1794; died May 7, 1849. He distinguished himself in the War of 1812, was made captain in 1815, and commanded a department at the time of the insurrection on the border of Canada, in 1838. Later he fought against the Indians and in the Mexican War and was prominent in the battles of Monterey, Cerro Cordo, Chapultepec, and the City of Mexico. Congress presented him with a sword of honor for his services at Monterey, and he was similarly honored by the states of New York and Louisiana. A monument was erected to his honor at the junction of Broadway and Fifth Avenue, New York.

WOUND, the name applied to any incision, or puncture, in the fleshy part of the body, especially to an injury where the tissues are divided by mechanical force. Injuries of this kind are termed *penetrating*, when a cavity is cut into the body without passing through it, and *perforating*, when they form an opening through the body or through a particular part of it. Sharp-edged instruments cause wounds that are classed as *cuts* or *incisions,* while pointed weapons thrust into the body produce *stabs* or *punctured wounds.* Animal venom or virus as well as poisonous matters produce *poisoned wounds,* while those caused by dull instruments are usually classed as *lacerated wounds.* Injuries resulting from gunshot are usually penetrating and sometimes lacerated. They are usually dangerous because of the complications that may arise.

Wounds may be said to have a local and a general effect. The local symptoms consist of pain, bleeding, and impairment of function, while the general effect includes a shock upon the nervous system and injury by excessive bleeding. Later other complications may set in, such as inflammation, gangrene, and bacteria. The first object in the treatment of a wound should be to stop the bleeding, which may be done by bandaging so as to compress the vein or artery that has been opened. The next step is to wash the affected part with warm water, bathe with an antiseptic, such as a solution of boric acid, and then bandage with light cloth or gauze. It is necessary to disinfect and redress the wound from time to time, and it should be kept entirely free from foreign matter and impurities. Where the ruptured nerves and blood vessels remain in close contact, healing takes place rapidly by what is termed *primary adhesion,* or *first intention,* but when the edges of the wound are left apart the healing is by *secondary intention,* or *granulation.*

WRANGLER (răn′glẽr), the term applied to a student who attains the first class in the mathematical honor in examination in the University of Cambridge, England. Any number of students may attain to the honor of wrangler, but the one who makes the best record is called the *senior wrangler.* The examination is public and the honors are commonly called *mathematical tripos.*

WREN (rĕn), the common name of several kinds of small birds related to the warblers. Most species are native to America, but birds



WREN.

of this class are found in abundance in the Old World. The *house wren* of Canada and the United States builds its nest near houses and in boxes placed for it in house yards. It is about five inches long with an alar extent of ten inches, has a reddish-brown color with whitish markings below, and is known to have great valor in defending its nest against other birds. Two broods of young are reared in a season. This species of wren is a very common kind of birds and has a beautiful song. Other familiar species include the *marsh wren, winter wren,* and *Carolina wren.* The common European wren is somewhat smaller, being about four inches in length, and with the exception of the golden-crested wren is the smallest bird in Europe. Nearly all the wrens are similar in being rather bold and having a slender bill, short wings, and a short and erect tail.

WREN, Sir Christopher, architect, born in East Knoyle, England, October 20, 1632; died February 25, 1723. He graduated from Oxford

University and in 1657 became professor of astronomy at Gresham College. Wren, being of an inventive turn of mind, devised various mathematical instruments, including a set of globes to teach the phases of the moon and several notable improvements on the barometer. Charles II. chose him, in 1663, to make designs for restoring Saint Paul's Cathedral in London, but that building was destroyed by fire in 1666 and Wren was commissioned to rebuild the cathedral. Though hampered in preparing his plans by the ecclesiastical authorities, he was afterward permitted by the king to make a number of modifications and improvements in the designs. The new building was begun in 1675 and completed after 35 years' work, Wren witnessing the laying of the last stone by his son. Other notable buildings designed by Wren include the Royal Observatory at Greenwich; Pembroke College, Cambridge; the Hospital of Chelsea; the campanile of Christ Church, Oxford; the towers of the west front of Westminster Abbey; and the churches of Saint Michael, Saint Stephen, and Marylebone. He was chosen president of the Royal Society in 1680 and was a member of Parliament from 1685 to 1700. Charles II. knighted him in 1673. He was buried at Saint Paul's, where his tomb bears the inscription, *Si monumentum requiris, circumspice,* meaning, if you seek his monument, look around.

WRESTLING (rĕs'lĭng), an athletic sport between two persons, each of whom endeavors to force his antagonist to the ground without resorting to kicks or blows. It is one of the most universal of athletic exercises and is a trial of both skill and strength. The Greeks greatly encouraged wrestling as a gymnastic exercise and the victors at the Isthmian, Nemean and Olympic games who excelled in this sport received the highest honor. It was cultivated extensively by the Romans, but their contests were more savage and brutalizing than a fair test of wrestling. The sculptures obtained from Egypt make it evident that wrestling was practiced at a very early date. However, the ancient wrestler was almost nude and covered his body with oil, thus to render himself more subtle in combat with his opponent. This practice made it very difficult to get a firm hold of one another and the wrestlers were permitted to use sand on their hands. They took hold of each other by the arms, employed many contortions of the body, interlocked their limbs, and used other similar methods to cause the opponent to be thrown to the ground.

Modern wrestling has been reduced to a skillful art and the rules for this sport are very numerous and quite elaborate. The *catch-as-catch-can* system places the antagonists in an open space facing each other, and at a given signal permits them to move in close contact and take any hold they may choose. In the system of *collar and elbow wrestling,* the opponents face each other and at the signal make the attack by seizing hold by the collar and at the elbow. A contestant is not considered down unless both shoulders and one hip, or both hips and one shoulder touch the ground, which is decided by an umpire. If a contestant, to save himself from a fall, loosens his hold with one or both hands, it is counted against him as a fall. A contest consists of three or five falls, each being succeeded by an intermission of fifteen minutes.

Another system is the *back-hold catch,* in which the opponents stand close together, facing each other, but in such a position that the chins rest on the shoulders of the opponents. Wrestling begins at a signal and any method of throwing, except kicking or brutality, may be employed. To win the contest, it is necessary to throw the opponent so both shoulders will touch the carpet. Other systems include the *hammer-lock,* the *half-Nelson,* the *Cornwall and Devon,* and the *Lancashire style. Jiu-jutsu* is a system of Japanese wrestling, but the methods employed are very numerous. Tokio alone has forty schools in which this form of wrestling is taught, but they all differ in some minor respect, and many others are practiced in different parts of that country.

WRIGHT (rīt), **Carroll Davidson,** statistician, born in Dunbarton, N. H., July 25, 1840; died Feb. 20, 1909. He attended an academy and began the study of law, but soon joined the Federal army. His services in the Civil War caused him to be promoted to the rank of colonel and after the war he was admitted to the bar. In 1873 he was made chief of the Massachusetts bureau of labor statistics, became chief of the United States Bureau of Labor in 1884, and became the head of the Department of Labor in 1888. He published a number of authoritative works on labor and economic questions and became noted as a statistician and investigator of social problems. Andrew Carnegie appointed him as trustee of the Carnegie Institution. In the meantime he held several positions in educational institutions, including the presidency of the college department of Clark University. His publications include "Convict Labor," "Factory System of the United States," "Relations of Economic Conditions to the Causes of Crime," "Strikes and Lockouts," "Relation of Political Economy to the Labor Question," "Scientific Basis of Tariff Legislation," and "Hand Labor in Prisons."

WRIGHT, Horatio Governeur, soldier, born at Clinton, Conn., March 6, 1820; died July 2, 1899. He graduated at West Point in 1841, served as an engineer for six years, and held an official position at Washington until the beginning of the Civil War. In 1861 he was chief engineer at the first Battle of Bull Run, was commissioned brigadier general the same year, and was placed in command of the Port Royal expedition. The following year he captured

Jacksonville and Saint Augustine, Fla., and soon after took command of the department of the Ohio. In the Battle of Gettysburg he led a division, took part in the campaign against Petersburg, and was called to defend Washington against the threatened attack under General Early, whom he defeated at Snicker's Gap. At the close of the war he was mustered out of the volunteer service and took up engineering. His efficient services at the capture of Petersburg caused him to be promoted to the rank of major general. He retired from active service in 1884.

WRIGHT, Orville and Wilbur, inventors and aëronauts, sons of Milton Wright, a bishop of the Church of United Brethren in Christ. Orville was born at Dayton, Ohio, on Aug. 19,



ORVILLE WRIGHT. WILBUR WRIGHT.

1871, and Wilbur was born near Millville, Ind., on April 16, 1867. The latter died at Dayton, O., May 30, 1912. They began to study balloons and the general subject of aviation at an early age. In 1896 they established a small shop in Dayton, Ohio, where they repaired and built bicycles, but gave the greater share of their time to the production of a flying machine. As early as 1903 they produced a machine which was heavier than the air and would remain in the air about two minutes. Two years later they improved this machine so they could rise or descend with it at will, although it remained in the air only a few minutes. In 1908 they succeeded in producing the first of their numerous heavier-than-air machines which enabled them to make very satisfactory tests, both in Europe and America. Orville Wright made a famous test of the Wright aëroplane at Fort Myer, Va., in that year, when he made a record of 40 miles per hour, remaining in the air 1 hour, 14 minutes, and 20 seconds. Wilbur Wright surpassed this record in his flights in France, remaining in the air more than two hours. It has been proven by subsequent tests that the Wright machines were among the most serviceable produced up to 1912.

WRIGHT, Luke E., public man, born in Memphis, Tenn., in 1847. He was educated under private tutors, became a member of the bar at Memphis, and practiced his profession with eminent success. From 1880 to 1888 he was attorney general of Tennessee, supported the candidates of the Gold Democratic party in 1896, and was appointed by President McKinley in 1900 as a member of the commission to establish civil government in the Philippines. While Governor Taft was absent from the Philippines on a trip to the United States and Europe, in 1902, he was acting governor and in 1903 was appointed Governor of the Philippines. He published a number of pamphlets and numerous magazine articles relating to jurisprudence and the colonies.

WRIGHT, Silas, statesman, born at Amherst Mass., May 24, 1795; died Aug. 27, 1847. He studied law and began to practice at Kenton, N. Y. In 1823 he was elected to the State senate as a Democrat, where he formulated a financial policy that he supported throughout his public career. He became comptroller of New York in 1829 and United States Senator in 1833, and in the latter capacity he supported the policies of Andrew Jackson. In 1844 he was chosen Governor of New York and as such took a decided ground against the antirent rioters. In 1846 he retired from public service, having declined a seat in the Cabinet of President Polk.

WRIT, a written order issued by the authority of a state or province, requiring a person to do something mentioned in the same. Such a document is issued by a court or some other official and the person commanded to act is required to appear at the time or place mentioned, or do whatever may be directed. A writ is issued under the seal of a public official and it is served, or executed, by the sheriff or some other similar officer. A *writ of mandamus* commands a person or inferior court to do a duty or fulfill an obligation; of *injunction,* restrains action; of *error,* requires the removal of a cause from a lower to a higher court to correct an error; of *subpoena,* commands the attendance of a witness; of *ejectment,* removes an occupant from certain premises; of *replevin,* permits the recovery of goods taken illegally; of *certiorari,* requires the record of a cause to be sent for review from an inferior to a higher court for examination; of *quo warranto,* requires an official to show by what right an office is held or an act is done; of *attachment,* directs taking property into custody by virtue of a legal process; and of *habeas corpus,* has for its object to bring a party before a

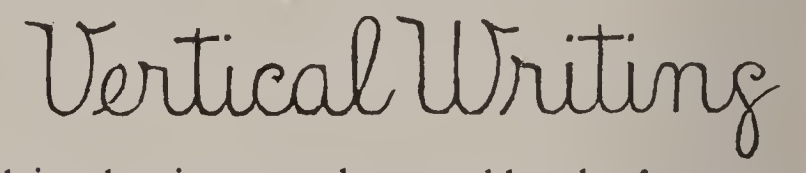
court or judge, especially one to inquire into the cause of a person's imprisonment.

WRITING, the art of recording ideas on paper, stone, parchment, or any other material by means of letters and characters. The art of writing is usually divided into *ideographic,* in which ideas are represented by signs, and *phonographic,* in which letters or signs are used to represent sounds or words. Writing was introduced into Europe from Phoenicia, which derived its system from the Egyptians. The Egyptian system was hieroglyphic, in which it was attempted to convey ideas by copying objects direct from nature. For this reason it is sometimes called *picture writing.* The characters used were afterward supplemented by a number of arbitrary signs; hence the Egyptian system became both ideographic and phonographic.

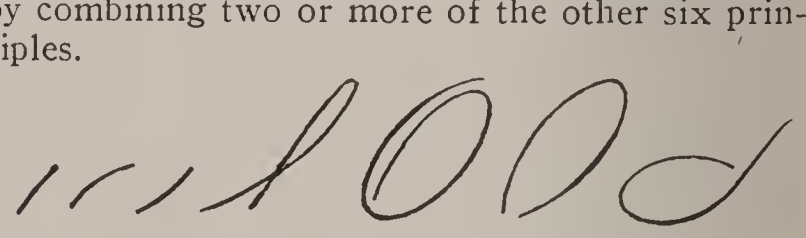
It is generally assumed that all alphabets are of hieroglyphic origin and that all systems of writing originated from four or five distinct hieroglyphic systems. These include the Egyptian, the Chinese, the cuneiform, the characters originally used in Yucatan, and the Aztec or Mexican. However, the Egyptian system has been the most potent in influencing the writing systems now employed, though there is still a question as to whether the cuneiform or the Egyptian is of the greater antiquity. The Latin, Greek, Sanskrit, and all European languages are written from left to right, but the Hebrew is written from right to left, while the Chinese signs or symbols are read in columns from top to bottom. No alphabet is employed in the mode of writing used by the Chinese. Their system is strictly ideographic, the characters are syllabic, and the words are monosyllabic. About 40,000 characters make up the Chinese system. The Sanskrit alphabet is the most perfect known and is made up of 14 vowels and 43 consonants.

Capital letters were not employed to distinguish prominent words until after mediaeval times. In the period from the 4th to the 8th century uncial letters were used principally in manuscripts. These were large and of nearly uniform size, resembling modern capitals, but they were characterized by greater roundness. In the 13th century the Gothic characters, differing slightly from the Roman types, came into general use in writing church books, but this form was supplanted largely in Saxony and other regions of Germany by the Saxon style. The Saxon style was introduced in England by the Saxon conquerors, but was afterward modified by the Roman, Lombardic, and other characters. It continued in general use until the time of George II., when it was abolished by law and the present Latin system was introduced. An improved form of the Saxon style is now employed by the Germans, Scandinavians, and other classes. Attempts to introduce systems of phonetic writing have been made at various times, and it is still the hope of many educators to devise a method in which an invariable sign will represent each sound. The phonetic idea is exemplified in many systems of shorthand writing.

Two distinct systems of penmanship are generally taught in the English and American schools which are known as the slant and vertical. Until recently slant writing was employed almost universally and it is now taught most extensively, but vertical penmanship has been adopted in many schools, both public and private. The advocates of vertical writing, a sample of which is shown in the figure, make the



claim that it so nearly resembles the forms employed in printing that the learners are able to read it as readily as print. However, makers of text-books have originated various styles of vertical writing, some differing but slightly from the slant. As a general rule beginners write more legibly in the vertical hand, but they do so at a loss of speed. Seven principles are employed in slant writing, as shown in the illustration. These are known respectively as *slant line, left curve, right curve, extended loop, direct oval, reverse oval,* and *capital stem.* They are numbered from left to right, as 1, 2, 3, 4, etc. The fifth is the capital letter O, and all other letters are formed by combining two or more of the other six principles.



PRINCIPLES OF SLANT WRITING.

Three essentials should be made objective in teaching and studying penmanship. They are legibility, rapidity, and beauty, but of these the first two are the most important. Both legibility and rapidity depend upon constant practice, but it is highly essential that learners acquire the



HOLDING THE PEN.

habit of holding the pen correctly and of sitting properly at the desk. The feet should rest squarely on the floor and the desk and seat need to be of the proper height, else the pupil will be hindered in the free use of the muscles of the

arm and hand. It is best to hold the pen loosely, as a firm grasp tends to tire the muscles, causing them to become overtaxed and unsteady. Little progress can be made until the eye becomes trained to perceive and judge of correct and beautiful forms and the hand has had sufficient practice to execute and produce them correctly. To do this pupils need adequate supplies, such as good pens, practice paper, copy books, and a superior grade of black ink. A definite period each day should be set apart to practice penmanship and the work needs to be done with care, else the progress will not be material and the copy books may become disfigured by blots. To teach writing successfully, one needs to be a good penman and a careful student of the movements employed by the learner.

WRITS OF ASSISTANCE, the warrants issued by the courts of revenue officers to enforce the navigation and revenue laws in the American colonies. Parliament passed an act providing for these writs, in 1754, and they were further legalized in 1766. They differed from an ordinary search warrant in that they were not limited as to time for making an inspection of the premises for goods, and it was not required to specify the premises where search was to be made. Much objection was raised by the colonists, since the general terms of the warrants made it possible to abuse the liberty of the subjects. James Otis argued against such writs before the superior court of Massachusetts in 1761, but they were held to be legal. Subsequently they were rarely issued.

WRYNECK (rī′nĕk), the name of a small bird of the woodpecker family, so called from its peculiar habit of twisting the neck in a serpentine manner. The body is about seven inches long, has a rusty ash color, and is marked by irregular spots of brown and black. The common wryneck of Europe is migratory. It moves north in the spring as far as Great Britain and Russia and feeds upon ants and other insects. Several species are found in Africa.

WUNDT (vo͝ont), **William,** sociologist and philosopher, born at Necharau, Germany, Aug. 16, 1832. He was educated at Heidelberg, Tübingen, and Berlin, received degrees in law and medicine, and in 1857 became teacher of physiology at Heidelberg. In 1865 he was made professor of philosophy at Zurich and later held a similar position at Leipsic. He published many works and may be regarded the leading representative of modern psychology among the educators of Europe. His chief works are "Theory of the Movement of the Muscles," "Lectures in Human and Animal Psychology," "Handbook of Medical Physics," "An Investigation of the Facts and Laws of the Moral Life," "System of Philosophy," "Outline of Psychology," and "Popular Psychology."

WÜRTTEMBERG (vürt′tĕm-bĕrg), a kingdom in southern Germany, lying between Hohenzollern, Baden, Bavaria, and Lake Constance. It is separated from Switzerland by Lake Constance, a beautiful sheet of fresh water. The length is 138 miles; width, 106 miles; and area, 7,535 square miles. It is chiefly an agricultural region, about two-thirds of the entire area being under cultivation, and fully three-tenths is covered with forest. Ranges of the Alps cross the southern part, and in the interior are the Hohenstaufen Hills. It has fine forests of pine, oak, beech, and other valuable timber. The mineral deposits include gypsum, copper, coal, iron, bismuth, cobalt, limestone, salt, and granite. The climate is highly favorable to the cultivation of cereals and fruits and is exceptionally healthful. Wheat, corn, rye, hay, barley, hops, tobacco, and vegetables are the principal productions. The vineyards yield large quantities of excellent grapes, which are made into Rhine and Champagne wines. Live stock of all kinds is abundant, especially milch cows, horses, cattle, and swine. The manufactures include ironware, clothing, woolen and silk textiles, beet sugar, spirituous liquors, chemicals, scientific instruments, and machinery. Navigation facilities are provided by several canals in connection with the Danube and Neckar rivers, but extensive railroad facilities are maintained in all parts of the country. The chief cities include Stuttgart, Ulm, Heilbronn, and Esslingen.

Württemberg is a constitutional kingdom. The sovereign holds his office by heredity. It is divided into four circles (*Kreise*) for governmental purposes, which include the provinces of Neckar, Jaxt, Black Forest, and Danube. The kingdom has four votes in the federal council of the German Empire and seventeen representatives in the national diet. Efficient elementary and secondary school systems are supported by the government and school attendance is compulsory. A recent official census shows that not an individual in the kingdom, above the age of ten years, is unable to read and write. The government maintains a fine system of benevolent and reformatory institutions, industrial schools, and institutions of higher education. The University of Tübingen, founded in 1477, is one of the famed institutions of Europe, and the Polytechnic School at Stuttgart is noted for its educational influence on public thought. Although no established religion is recognized by the government, the inhabitants are almost exclusively Protestant and the king is vested with the supreme direction of the Protestant Church.

The earliest inhabitants of Württemberg probably were Celtic, but the Suevi occupied the country at the time of the Roman conquest, and in the period of the decline of Rome it was overrun by the Alemanni and the Franks. Conrad, Count of Württemberg, possessed a small territory in 1090, but his successors added considerably to the possessions, especially Ulrich I., who governed the country from 1246 to 1265. It was erected into a dukedom in 1495 by Emperor Maximilian, who conferred upon the reigning

duke the title of Eberhard I. In 1805 it became a kingdom, in consequence of Duke Frederick II. having aided Napoleon. His son, William I. (1781-1864), reigned for a period of fifty years, giving the people a liberal and progressive government. The kingdom joined the German Empire in 1871 and has since been an influential factor in the Federal government. Stuttgart is the capital and largest city. Population, 1905, 2,302,179; in 1920, 2,435,611.

WU TING FANG (wo͞o tĭng făng′), diplomat and statesman, born at Singapore, in the Straits Settlements, in 1842. He was enrolled at Saint Pauls College, Hong Kong, in 1855, where he studied five years, and subsequently became interpreter in the British law courts. Afterward he studied law at Lincoln's Inn, London, and was admitted to the bar and practiced his profession at Hong Kong. The government of China placed him on the official staff of Li Hung Chang in 1882, and he served on the commission that negotiated the Treaty of Shimonoseka. In 1896 he was made minister to the United States and became prominent as an opponent of the Chinese exclusion act. The Chinese government recalled him in 1902 and made him commissioner to aid in negotiating treaties with foreign countries. He was made vice president of the board of commerce in 1903, and as such officer exercised a wide influence in opposition to the Chinese boycott of American products in 1905. The following year he began to advocate the adoption of the jury system in China.

WÜRZBURG (vürts′bo͞org), a city of Germany, in the northwestern part of Bavaria, sixty miles southeast of Frankfort-on-the-Main. It is finely situated on the Main River, which is crossed by a number of substantial bridges, and has extensive railroad facilities. The principal buildings include the Julius Hospital, the Neumünster Kirche, the Episcopal Palace, and the famous University of Würzburg. This university was founded in 1582 and has 1,500 students and a library of 352,000 volumes. The city has a number of other institutions of learning, including a gymnasium, a seminary, and a college of agriculture and mechanic arts. Marien Kappelle, a church of great beauty, is adorned with fourteen statues of famous men. Würzburg has a number of beautiful monuments and statues, including one erected to the memory of Walther von der Vogelweide. The streets of the city are paved with stone and asphalt. It has systems of gas and electric lighting, sanitary sewerage, waterworks, and electric street railways. Among the manufactures are cotton and woolen textiles, leather, glassware, railroad cars, machinery, and farming implements. A battle occurred between the Prussians and Austrians near Würzburg in 1866. About 7,000 French prisoners were confined in its prison and barracks at the time of the Franco-German War. Population, 1905, 80,327; in 1920, 84,387.

WYANDOTS (wī-ăn-dŏts′), a North American Indian tribe of the Iroquois family. They first came in contact with the whites in the vicinity of Lake Huron, where they engaged in the culture of tobacco, from which circumstance they were called the Tobacco Indians for some years. The Iroquois nearly exterminated them in 1636 and the surviving remnant settled in the vicinity of Detroit, Mich. In 1812 400 Wyandots sided with the English. Subsequently they sold their lands to the United States, some of them removing to Canada and others to Kansas. At present they number about 800, of which about 100 are in Ontario, 350 are in Oklahoma, and 400 are in Quebec.

WYANDOTTE (wī′ăn-dŏt), a city of Michigan, in Wayne County, twelve miles southwest of Detroit. It is situated on the Detroit River and on the Michigan Central, the Grand Trunk, the Lake Shore and Michigan Southern, and other railroads. The chief buildings include the public library, the high school, and a number of fine churches. It has manufactures of malt liquors, furniture, gasoline engines, salt, chemicals, clothing, and farming machinery. The public utilities include electric lighting, sanitary sewerage, and waterworks. Wyandotte was platted in 1854 and incorporated in 1867. Population, 1904, 5,425; in 1920, 13,851.

WYANDOTTE CAVE, an important subterranean passage four miles north of Leavenworth, Ind. It rivals the Mammoth Cāve of Kentucky and has been explored about 22 miles. The two largest rooms range in height from 150 to 245 feet and have beautifully formed chambers of stalactites and stalagmites. The different places of interest include those known as the White Cloud Room, the Mammoth Hall, the Pillared Palace, and the Beauty's Bower. In some places the walls are covered with crystals of Epsom salt. Beautiful white gypsum rosettes are in the cave.

WYANT (wī′ănt), **Alexander H.,** landscape artist, born in Port Washington, Ohio, Jan. 11, 1836; died in New York City, Nov. 29, 1892. After studying in his native country, he received instruction under Hans Gude at Carlsruhe, Germany. Subsequently he visited many countries of Europe and on returning to the United States was made an Academician, in 1869. He devoted much time to painting autumn effects in American forests, particularly along the Ohio River and in the Adirondacks. His best works include "Wilds of the Adirondacks," "Late Autumn," "View on Lake George," "Sunset on the Prairie," "Scene on the Upper Susquehanna," and "Scene on the Upper Little Miami."

WYATT (wī′ŭt), **Richard James,** sculptor, born in London, England, May 3, 1795; died in Rome, Italy, May 29, 1850. He descended from a family which is noted because it includes a number of architects and sculptors. After studying in his native city, he pursued a course in Paris and afterward studied art in the studio of Canova at Rome. Many of his works take high

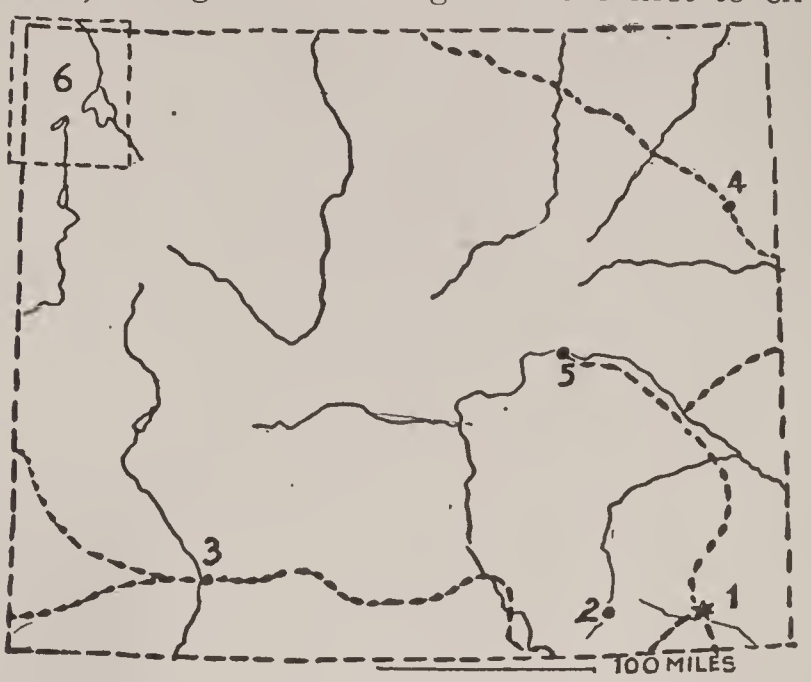
rank for their delicacy and finish and several of them won a number of medals. His best known sculptures include "Ino and Bacchus," "Penelope," and "Eucharis and Cupid."

WYATT, Sir Thomas, poet, born in Kent, England, in 1503; died Oct. 11, 1542. Although his poetry does not take high rank in intrinsic value, yet he is an important figure in the early history of English literature. After studying at Cambridge, he became attached to the court of Henry VIII. and was present at his wedding with Anne Boleyn. He was knighted in 1536 and was twice sent as ambassador to the court of Charles V., in which capacity he acquitted himself with much diplomatic skill. On returning to England he lived in comparative retirement at Allington, where he devoted himself to writing poems and satires. His songs and sonnets are among the best early literary productions in England and may be said to rank with those of Surrey.

WYCLIFFE (wĭk'lĭf), or **Wyclif, John,** noted reformer, born in Yorkshire, England, about 1324; died Dec. 13, 1384. He descended from a noble family, was educated at Oxford University, and was appointed master of Baliol Hall, now called Baliol College. Subsequently he was made rector of Lutterworth, in Leicestershire, and soon became noted as an opponent of the monks, against whom he directed various religious writings. At that time disputes took place between Edward III. and the papal court in regard to certain tribute money, which the king had refused to pay, and Wycliffe came forward with a number of tracts in support of the king. He labored zealously in the rectory of Lutterworth until his death, but several times was sorely tried by those opposed to his progressive views of reform. In 1378 he was summoned before a convocation at Saint Paul's Church by Courtenay, Bishop of London, but his friends came to his assistance by breaking up the meeting in confusion.

Three bulls were issued by the Pope to the king, the primate, and the University of Oxford, in which each was commanded to proceed against Wycliffe, but nothing further came from the proceedings than that he was enjoined from preaching obnoxious doctrines against the Pope. He was engaged for some time in translating the Bible from the Latin Vulgate and in 1381 publicly challenged several doctrines of the Catholic Church. Archbishop Courtenay called a provincial council, which declared Wycliffe a heretic, and some of his works were burned. A number of his followers were imprisoned for making gross charges against the authorities, but he was allowed to return to Lutterworth. The Council of Constance condemned his doctrines about thirty years after his death, but they left a marked influence upon public thought. Wycliffe wrote a large number of works in Latin and English and many tracts. His followers were called Lollards, from the fact that they displayed much eagerness in their efforts to spread his doctrines.

WYOMING (wī-ō'mĭng), a western State of the United States, popularly called the *Equality State,* owing to its having been the first to extend the right of suffrage to women. It is bounded on the north by Montana, east by South Dakota and Nebraska, south by Colorado and Utah, and west by Utah, Idaho, and Montana. The length from east to west is 356 miles and the width from north to south is 275 miles. It has an area of 97,575 square miles.



WYOMING.

1, Cheyenne; 2, Laramie; 3, Rock Springs; 4, New Castle; 5, Casper; 6, Yellowstone National Park. Principal railroads shown by dotted lines.

Description. The State is crossed from southeast to northwest by the Rocky Mountains, which form the Continental Divide and are the source of a number of important rivers. Wyoming is a lofty plateau with an average altitude of about 6,000 feet, but many of the mountains tower far above the snow line. The principal mountain chains include the Shoshone, the Teton, the Wind River, the Big Horn, the Sweetwater, and the Laramie ranges. On the eastern boundary, between Wyoming and South Dakota, is the group known as the Black Hills. Among the chief peaks are Laramie, height 10,975 feet, and Fremont, 13,570 feet. In the northwestern part is the famous Yellowstone National Park, which has an area of 3,575 square miles and is remarkable for its natural scenery and numerous geysers. This region is a rugged complex of lofty mountains and extensive cañons, but is beautified by fine lakes and streams.

The drainage belongs to two systems, the headstreams being separated by the Rocky Mountains. The streams on the eastern slope belong to the Missouri system and those on the western slope are classed with the systems of the Colorado and the Columbia rivers. Yellowstone and Jackson lakes are the only large sheets of water. Jackson Lake is the source of the Snake River, which is a tributary of the Columbia, and Yellowstone Lake is the source of the Yellowstone, a confluent of the Missouri. Other streams belonging to the Missouri system include the Big Horn,

the Powder, the Cheyenne, the Belle Fourche, the Wind, the North Platte, and the Laramie rivers, while the Greene River belongs to the Colorado basin. None of the rivers is navigable, but many are important for irrigation and the water power that they furnish.

The climate, like that of other Rocky Mountain states, is arid and healthful. At Sheridan the mean temperature for January is 18° and at Cheyenne it is 25°, while the mean in July of both localities is 67°. The maximum temperature is somewhat above the 100° and the minimum falls as low as 40° below zero. Rainfall for the State is given as 13 inches, but it ranges from 16 inches in the eastern to 8 inches in the western parts. The largest falls of rain occur from March to June and the remainder of the summer season is extremely dry.

Mining. Wyoming is rich in many of the useful minerals. It has an abundance of coal and there has been a steady increase in the output of this product. The normal average is placed at 6,800,000 short tons per year. Petroleum is found in many parts of the State, especially in Fremont and Natrona counties, and the annual production is placed at 10,500 barrels. Iron deposits occur in many localities and granite and limestone are abundant, but these minerals have not been developed extensively. Gold and silver are mined profitably and mineral waters and natural gas are found in abundance. Other minerals include copper, zinc, salt, soda, asbestos, gypsum, sulphur, bismuth, clays, and graphite. The deposits of minerals are not worked as extensively as conditions would justify, owing largely to the lack of adequate transportation facilities.

Agriculture. It is estimated that about one-sixth of the State is capable of cultivation, though irrigation must be resorted to for the production of most crops. The lands lying between the mountains and the valleys of the rivers are generally fertile and a large supply of water is available for irrigation. A large proportion of the inhabitants reside in the valley of the North Platte River, which supplies a large part of the water. Extensive forests of cedar, pine, spruce, aspen, and cottonwood abound in the mountains and along the streams, but the broad plateaus are without timber and can be easily cultivated. Hay and forage crops are grown most extensively. Oats and wheat are the leading cereals. Other products include corn, barley, rye, potatoes, and the hardier fruits.

The native grasses cure naturally in the dry climate, hence are of much value for grazing, especially in that they furnish food for stock throughout the winter. Sheep are raised very extensively, the number being 6,525,000 head. Cattle are grown chiefly for meat, but rapid developments are taking place in dairying. Other domestic animals include horses, swine, mules, and poultry. Cattle, horses, and sheep are raised extensively on large ranches.

Manufactures. A lack of facilities to transport iron, timber, petroleum, and other products to the towns has retarded manufacturing to a considerable extent. A large proportion of this enterprise is confined to railway repair shops. The leading products include lumber, flour and grist, brick and pottery, soda and chemicals, clothing, and machinery. There has been a material increase in the output of butter and cheese, tobacco products, and farming implements the past decade.

Transportation. None of the rivers within the State is navigable and many sections are not provided with railway facilities. The railway lines have a total of 2,150 miles in operation and they are confined principally to the southern and eastern parts of the State. The transcontinental line of the Union Pacific crosses the southern part of the State from east to west, the Chicago, Burlington and Quincy crosses the northeastern corner, and a line of the Chicago and Northwestern penetrates the east central part. Other railways have branches in the southeastern section and the Yellowstone National Park is reached by a branch of the Northern Pacific, though it does not enter the State. Few of the highways have been improved, but trails for interior travel have been located, which are used chiefly for transportation by mules and horses.

Government. The constitution was adopted at the time Wyoming became a State, in 1890. It grants equal political rights to both sexes and is the first document of this kind to extend the right of suffrage to women. The executive authority is vested in the governor, secretary of State, treasurer, auditor, and superintendent of public instruction, each elected for four years. The Legislature consists of a senate of 23 members and a house of representatives of 50 members. Sessions of the Legislature are held biennially. A chief justice and two associates constitute the supreme court. Other courts may be established by the Legislature, including circuit, probate, and justices' courts. Local government is vested in the towns, municipalities, and counties.

Education. The State has occupied an enviable position from the standpoint of education since its admittance to the Union, having had a very small per cent. of illiteracy during the entire period. However many sections within the State are so sparsely settled that it is difficult to provide educational facilities in some localities. All parts which are settled have public schools. A compulsory attendance law has been inforced since 1907. The schools are maintained largely by the rental of public lands which have been set aside for school purposes, but additional support is given through a system of general and local taxation. Text-books are supplied free by the State, under a graded and uniform course of instruction.

The University of Wyoming, located at Lara-

mie, is at the head of the public school system. Cody City is the seat of the Cody Military College, Evanston has the insane asylum, and Cheyenne is the seat of the soldiers' home. Rock Springs has a State hospital and Rawlins has the penitentiary. All the schools and the State institutions are managed efficiently.

INHABITANTS. The State has a foreign-born population of 17,415, consisting chiefly of Germans, Scandinavians, and British. Among the leading religious denominations are the Mormons, Catholics, and Methodists. Cheyenne, on the Crow River, is the capital and largest city. Other cities include Laramie, Rock Springs, Rawlins, Sheridan, Evanston, and Green River. In 1900 the State had a population of 92,531. This included 3,480 colored people, of whom 393 were Japanese, 461 Chinese, 940 Negroes, and 1,686 Indians. Population, 1920, 194,402.

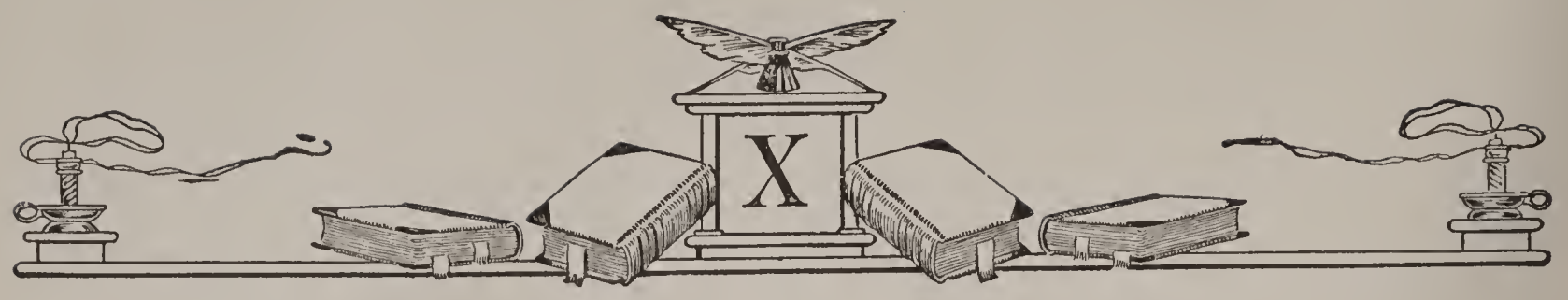
HISTORY. The region now included in Wyoming was acquired by the United States partly through the Louisiana Purchase of 1803 and partly by the Mexican cession of 1848. In 1834 the first white settlement was made on the present site of Fort Laramie. At that time the overland route to California extended through the country now included in the southern part of the State, particularly along the North Platte River, and many emigrants from the states further east sought their fortune on the Pacific coast by passing through the region. Mormons settled in the Green River valley in 1853 and about the same time several mining camps became developed. Wars with the Indians were extended and numerous, the chief tribes including the Sioux, Utes, Crows, Arapahoes, and Shoshones. General Crook reduced most of the tribes to submission in the period extending from 1876 to 1877, and soon after the Indians were either transported or placed on reservations. Wyoming was organized as a Territory in 1868 from lands which at one time were included in South Dakota, Idaho, and Utah. It was admitted as a State in 1890.

WYOMING, University of, a coeducational institution of higher learning at Laramie, Wyo., founded from the proceeds of public land grants in 1887. This institution includes all the departments of higher learning within the State. It is composed of the College of Liberal Arts, the Graduate School, the School of Mines, the College of Agriculture, the College of Mechanical Engineering, the School of Music, the School of Commerce, and the Normal School. Since many sections of the State are not supplied with high schools, the institution maintains a preparatory school with a two years' course. No tuition is charged in any department of these schools. Since Laramie has an ideal climate and Wyoming presents a great field for research work, many learned men and women are attracted to this institution as lecturers and instructors It has a library of 40,000 volumes, an income of $90,000, and property valued at $450,000. The attendance is about 600 students.

WYOMING VALLEY, a fertile and beautiful valley of the north branch of the Susquehanna River, in Pennsylvania. It is inclosed by mountains. The chief city in the region is Wilkesbarre, county seat of Luzerne County. Wyoming Valley is noted for its history as well as fertility. The Wyoming massacre occurred at the town of Wyoming on July 3, 1778, when 800 Tories and a large number of Indians made an attack on the inhabitants. Most of the men were absent on service in the Continental army and the town was obliged to surrender on July 5, when all those unable to flee were massacred by the Indians, who took 227 scalps and spared only the women and young children. The settlers were largely from Connecticut and their descendants made claim to the titles of the lands, which were afterward also claimed by citizens of Pennsylvania. This gave rise to the so-called Pennymite wars. Connecticut claimed the region until 1782, when Congress decided the contest in favor of Pennsylvania, and the State Legislature in 1788 confirmed the titles to those holding property. A fine monument was erected, in 1843, on the scene of the Wyoming massacre.

WYSS (vĭs), **Johann Rudolf,** author, born in Berne, Switzerland, March 13, 1781; died there March 30, 1830. He acquired a liberal education and in 1806 became professor of philosophy at Berne. Later he was made chief librarian in the university and became the author of many excellent works. His best known production is "The Swiss Family Robinson," which was translated from the German into French, English, and other languages and is still read extensively in many tongues. Other writings include "Readings in Relation to the Highest Good," "A Tour in Upper Berne," and "Swiss Folklore and Legends."

WYTHE (wĭth), **George,** signer of the Declaration of Independence, born in Elizabeth City, Va., in 1726; died June 8, 1806. He inherited a large fortune from his parents, but spent much of it in dissipation. Later he studied law and, after being admitted to the bar, in 1757, became eminent as a lawyer. He had a seat in the Continental Congress from 1775 to 1777 and there demonstrated much ability in advocating the absolute independence of the colonies. He was professor of law at William and Mary College from 1779 to 1789 and was chosen, in 1786, to aid in framing the Constitution of the United States. Though a large slaveholder, he emancipated those under his control and gave them means to support themselves until they became able to earn a living.



X, the twenty-fourth letter and nineteenth consonant of the English alphabet. It is often spoken of as a superfluous letter, because it represents no sound that may not be represented by other letters. Usually it has the sound of *ks* when occurring in the middle of a word, as in *taxes, axis, foxes*. At the beginning of a word it has the sound of *z*. In some words it has the sound of *ks* as a terminate letter, as in *lax, wax, tax*. In Roman writing *x* was the last letter in the alphabet. It signifies ten as a Roman numeral; when placed horizontally (ⅩⅠ) it represents a thousand, and with a dash over it ($\bar{X}$) the symbol indicates ten thousand. In algebra *x* is the usual symbol for the unknown quantity which is to be determined.

XANTHIPPE (zăn-tĭp′pe), the wife of Socrates, who is represented by most writers as a scolding dame. It is probable that the small concern shown by Socrates in affairs of household economy caused his wife to be frequently at wit's end to know how to make housekeeping possible; thus she developed an aptitude for calling attention to household necessities at times when Socrates returned from long conversational interviews with fellow philosophers and students. Plato describes her as a really kind woman, and one much concerned in the welfare of the household. However, the name has become proverbial and is associated with one who scolds by force of habit.

XANTHUS (zăn′thŭs), an ancient city in the southwestern part of Asia Minor, capital of Lycia, on the Xanthus River, near the present village of Gunik. The city seems to have been founded at a very early date, and its inhabitants were governed by independent princes. Lycia was invaded by the Persians and the capital was twice destroyed, the last time in 546 B. C., and Alexander captured it at the time of his campaign in the East. Brutus with a Roman army took possession of the city in 43 B. C., when only a few of the inhabitants survived. Many ruins of ancient structures have been uncovered, showing that the place was well built and contained many tombs and sculptures. The most noted buildings belonged to the 6th century B. C. and were evidently of Greek origin. They included many theaters, the statues of the Nereids, and a sculpture known as the Harpy Tomb, now in the British Museum. Among the remains still intact are the walls of the Acropolis, a Roman gate, and several tombs and temples.

XAVIER (zăv′ĭ-ẽr), **Saint Francisco**, saint and missionary of the Roman Catholic Church, born in Navarre, France, April 7, 1506; died near Macao, China, Dec. 2, 1552. His father was councilor of state to the King of Navarre and sent him to the University of Paris in 1524, where he made remarkable progress in his studies. In 1528 he became lecturer in philosophy, and soon after was granted a degree of master of arts. He joined the society formed by Ignatius Loyola with the view of doing missionary work in Palestine, and afterward joined others as a member of the Society of Jesus. Loyola selected him to labor in the mission field of the Portuguese possessions in the East Indies. He sailed with an associate from Lisbon on April 7, 1541, and reached Mozambique after a voyage of five months. After wintering in the southern part of Africa, he sailed for Ceylon and the Moluccas, and finally visited Japan. Xavier labored for ten years as a missionary in the East, and died at the time when he intended to begin missionary enterprises in China. The work of Xavier stands preëminent among the achievements of noted missionaries. He visited 52 countries to spread the gospel, and witnessed the baptizing of many thousands. Xavier is usually spoken of as the Apostle of the East Indies. Pope Gregory XV. canonized him in 1622, and Benedict XIV. proclaimed him protector of India. He was buried at Goa, then the capital of the Portuguese Indies. His writings consist largely of epistolary letters and a catechism.

XEBEC (zē′bĕk), a small vessel which has three masts with both square and lateen sails, being variously arranged. It differs from the *felucca*, a coasting vessel employed on the Mediterranean, in that the latter has only lateen sails. The Algerian pirates used xebecs which carried from twelve to twenty guns. Most of these vessels had low sides and the deck was somewhat convex, permitting the water to flow off through the scuppers.

XENIA (zē′nĭ-ȧ), a city in Ohio, county seat of Green County, fifty miles southwest of Co-

lumbus, on the Pennsylvania, the Cincinnati, Hamilton and Dayton, and other railroads. It is surrounded by a fertile farming region and has communication by several electric railroads. The chief buildings include the county courthouse, the public library, the city hall, the Ohio Soldiers' and Sailors' Orphans' Home, the United Presbyterian Theological Seminary, a business college, and a number of parochial schools. Near the city, at Wilberforce, is the Wilberforce University, which was opened in 1856 for colored students. Among the manufactures are paper, powder, tinware, cordage, glass, shoes, carriages, earthenware, and machinery. The city has pavements, gas and electric lighting, municipal waterworks, sewer drainage, and other improvements. Settlements were made in the vicinity as early as 1804. It was incorporated in 1808. Population, 1900, 8,696; in 1920, 9,110.

XENOPHON (zĕn'ō-fŭn), eminent general and author, born in Athens, Greece, about 445 B. C.; died in 357 B. C. He descended from parents who were in good standing and became a pupil of Socrates, under whom he studied philosophy. In 401 B. C. he joined the expedition of the younger Cyrus against Artaxerxes, King of Persia. It was rather his aim to visit Western Asia than to enter into the conflict of battle that he joined the army, but the Greek generals were treacherously murdered at the engagement of Cunaxa, thus devolving a large share of the responsibility connected with the generalship upon Xenophon. He was the leading spirit in the famous retreat of the 10,000 Greeks to Trebizond, on the Black Sea, and after returning to Greece joined the military service of the King of Sparta, which was then the leading state of the Greek world. Later he settled in Elis, where he devoted twenty years to literary work and agriculture. His writings include a number of excellent historical works, essays, and treatises. The "Anabasis" is his chief writing, in which he relates the history in connection with the expedition into Persia. This work is divided into three parts. The first relates to the invasion of Persia by Cyrus against his brother, Artaxerxes, and includes a description of the Battle of Cunaxa; the second recounts the retreat of the 10,000; and the third part describes the adventures of the Grecian army after reaching Trebizond. This work of Xenophon was written in a pure Attic Greek style. It exhibits the power of the author as an observer and portrays him as a strong and tireless worker. Other writings include the "Memorabilia," a record of the life and teachings of Socrates; the "Cyropaedia," a biography of Cyrus of Persia; the "Hellenica," a history of Greece covering 48 years; and the "Spartan and Athenian States," a work devoted to politics and economics. These and others of his writings have come down to us. Many translations from his works have been made by divers writers.



XENOPHON.

XERXES I. (zĕrks'ēz), King of Persia, eldest son of Darius. His birth and early history are unknown, but it is reasonably certain that he reigned from 485 to 465 B. C. He is mentioned as Ahasuerus in the Book of Esther, and is famous in history in connection with several noted Grecian campaigns. His father died in 485 B. C., while making preparations to invade Greece for the third time, and Xerxes immediately began to make elaborate plans for carrying his father's designs into execution. The preparations were remarkable in that provisions were collected to support a vast army for three years, a great transport fleet was constructed, and the most skilled engineers obtainable were engaged to plan the removal of natural obstructions. Historians agree that the army and navy represented a combined force of 2,000,000 men, and to secure the passage across the Hellespont a bridge of boats a mile long was constructed. Herodotus speaks of the army as numbering two and a half million combatants, though it is possible that this is an exaggeration, and states that it required seven days and nights for the forces to cross over the Hellespont.

Xerxes, having landed on European soil, marched unobstructed until he reached Thermopylae, where he was brought to a stand by Leonidas, who was at the head of a small though determined band of Spartans. The latter guarded the narrow passage with remarkable persistence until he was defeated through treachery, but when Xerxes reached Athens he found the city deserted. Though successful on land, Xerxes found his fleet driven to desperation and finally it was defeated. The Grecians attained success in two engagements at Artemisium and a storm did much damage to the Persian fleet, destroying 400 ships of war. In 480 B. C. the final naval battle was fought at Salamis, where the Persians were defeated with great loss, and Xerxes fled to the Hellespont. A storm had destroyed the bridge of boats in the meantime, hence he crossed over in a vessel and left Mardonius with a Persian army of 300,000 men to subdue Greece. That general was defeated by the Grecians the following year in the Battle of Plataea, and in 478 B. C. the last possession of the Persians in Europe was taken from them by the victorious Grecians. Xerxes spent his later years in obscurity and was finally murdered by the commander of his bodyguard, Artabanus, who attempted to usurp the Persian throne. However, Artaxerxes, his son, ascended the throne in 465 B. C. Herodotus represents Xerxes as cruel and

cowardly, but credits him with highly attractive personal qualities, and asserts that he was skillful in furthering the interests of his government.

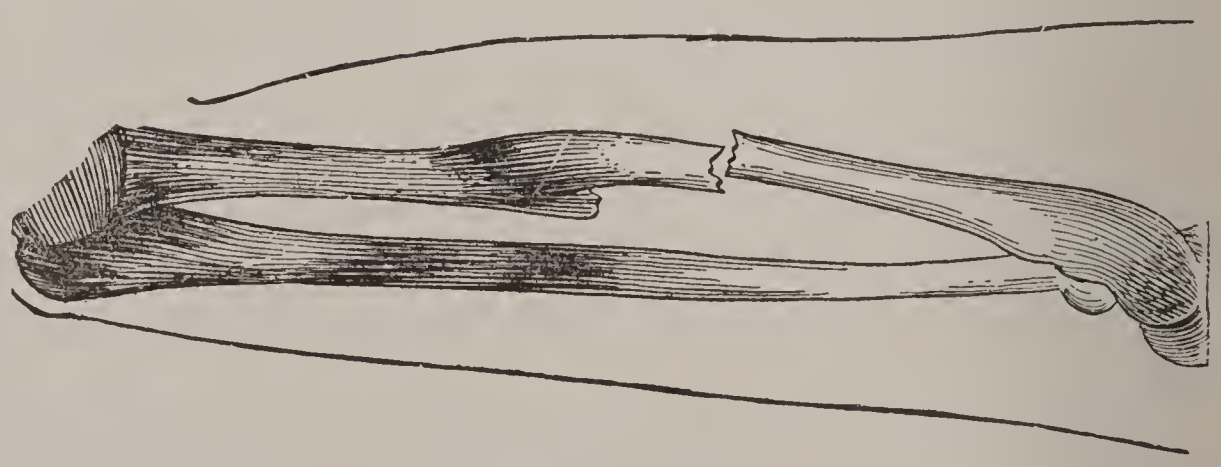
XIMENES (zī-mē'nĕz), **Francisco,** statesman and cardinal, born at Torrelaguna, Spain, in 1436; died at Branquillas, Nov. 8, 1517. He was born of humble parents, but obtained a liberal education at Salamanca and Rome, and while in the latter city was nominated prebend in the Cathedral of Toledo. The archbishop opposed his appointment and caused him to be imprisoned, but released him on surrendering his preferment. In 1482 he entered the Franciscan order of monks. His piety and learning caused Isabella to select him as confessor in 1492, and three years afterward she named him Archbishop of Toledo. The high degree of confidence placed in Ximenes by Isabella gave him a wide influence in the public affairs of Spain, and on her death, in 1504, he was likewise favored by Philip. The latter named him regent and guardian of Queen Joanna, who was simple-minded, on his death in 1506, and during his incumbency he extended the power of the crown by reducing that of the nobles. In 1507 he was raised to the dignity of cardinal, and at the death of Ferdinand, in 1516, he was made regent of Castile until the arrival of King Charles I., afterward Charles V. of Germany. No Spanish statesman of his period stands higher in repute as an administrator. He founded many schools, churches, and hospitals.

XIMENES DE QUESADA, Gonzalo, explorer, born in Granada, Spain, in 1495; died at Santa Agueda, South America, Feb. 16, 1579. He came to America on an exploring expedition in 1539, and had charge of the military forces of New Granada, now called Colombia, against the Chibcha Indians. Soon after reaching America he marched southward to conquer the interior regions, and in 1538 founded the city of Bogotá. Benalcázar and Frederman, two other explorers, sailed with him to Europe to submit their disputes to the king for arbitration. After hearing the cause of their disagreement, the king ordered Ximenes fined and suspended, but he was afterward sent as marshal to Granada, and in 1561 became governor of that region. As chief executive of the northwestern part of South America he served Spain with loyalty until his death. He wrote an account of his adventures, but his works are lost. In 1597 his remains were removed to Bogotá.

XINGÜ (shĕn-gōō'), an important river of Brazil, which rises on the plateau of Matto Grosso and, after a northerly course of 1,150 miles, flows into the Amazon, near the head of the estuary. Several impassable falls and rapids obstruct the stream in the course about 150 miles from its mouth, in a part of the river known as the Great Bend. It is navigable for steamers for 110 miles. In 1885 the river was explored with much care under the direction of the Brazilian government.

XOLOTL (zō-lōtl'), surnamed The Great, founder of the Mexican dynasty of Tenayucan, or Texcoco, flourished in the 12th century. After the downfall of the Toltec monarchy, he was the chief of the Chichimeca tribes and proclaimed himself king of the country tributary to Lake Texcoco about 1160. His ambition was to found a powerful monarchy. To accomplish that end he united with his kingdom the Toltecs, Aculhuas, and Tecpanecs and encouraged industrial and educational arts. He caused the Nahuatl dialect, a branch of the Toltec language, to be made the official tongue, which soon superseded all others and came to be called the Aztec. The city of Texcoco was made the center of Anahuacan civilization. It was beautified by fine squares and gardens, and in it he erected a palace and a temple dedicated to the sun. Two of his daughters married chiefs of the Aculhuas, who became the founders of the empire of Atzcapotzalco.

X-RAYS, or **Röentgen Rays,** the peculiar rays of light which are produced by sending electric discharges through exhausted glass tubes. They were discovered by Professor Röentgen in 1895 and were named *X-Rays*, meaning unknown rays. X-Rays are peculiar for their power of penetrating opaque objects, an example of which is shown in the accompanying illustration. All bodies seem to be transparent when subjected to these rays, but in different degrees. It will be seen that the flesh of the hand appears as a mere outline, while the rings on the fingers give a darker effect than the bones. The rays pass freely through blocks of wood, flesh, thick books, and plates of ebonite. Metals are among the most highly opaque substances, and bone is more opaque than flesh.



EFFECT OF X-RAYS.
Showing Broken Bone in Arm.

By means of these rays it is possible to make a photograph of the bones of the living hand, or of the organs in any part of the body, as the lungs, heart, muscles, and kidneys. It is possible to so apply these rays that a surgeon may

locate and examine minutely the fracture of a bone, a bullet, or a tumor in any part of the body. These rays are very serviceable in detecting pulmonary tuberculosis, to examine the



EFFECT OF X-RAYS.

Showing Bones of Hand.

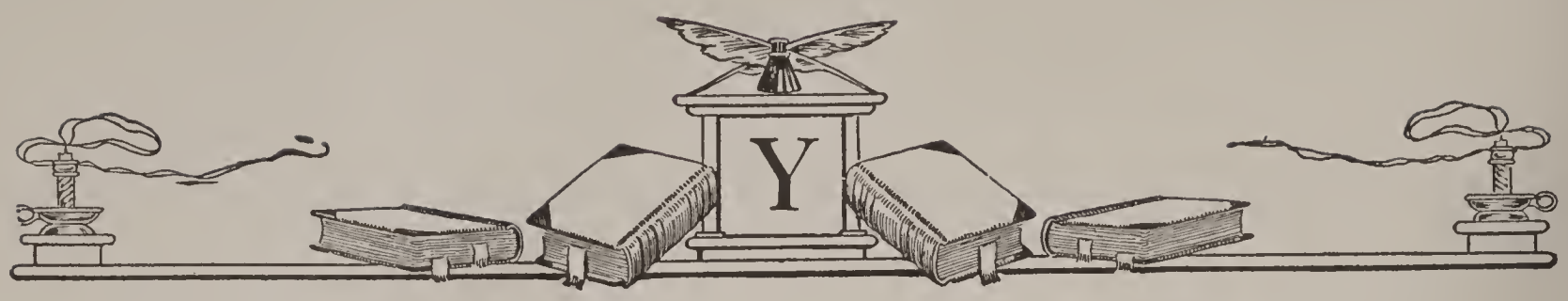
size and position of the heart, and in fact to observe the form and condition of practically all organs of the living body. It has been computed that one person in every 800 is blind to the X-Rays, that is, when looking through the fluoroscope is unable to see the objects clearly seen by the ordinary observer. The nature of the X-Rays and their origin are still in doubt, and, like electricity, they may be studied only by their manifestations. See **Cathode Ray; Crookes Tubes.**

XYLENE (zī′lēn), the name applied to three isomeric hydrocarbons, which were first obtained in a pure state from coal naphtha in 1863. Subsequently a process was discovered by which xylene is obtained successfully from wood spirit. The product is a volatile, inflammable liquid. It is colorless, boils at 282°, and has a peculiar odor. Several derivatives are obtained from it, including methyle-xylene, ethyle-xylene, and the nitro-xylenes.

XYLOPHONE (zī′lō-fōn), a musical instrument which consists of a series of bars of wood or glass, arranged horizontally upon two longitudinal cords or sills. The bars are graduated in length to the musical scale, and the instrument is played by striking them with two small hammers held in the hands. This instrument has a compass of about two octaves. It is of ancient origin and is now used extensively among the Poles and Russians. Recently it has become popular in connection with the phonograph, its tones being suitable for clear reproduction by the latter instrument.

X Y Z CORRESPONDENCE, the name applied to certain dispatches between the United States and France, at the time John Adams was President. The United States had received valuable aid from France at the time of the Revolution, which was in accord with treaties made in 1778, and the latter country desired an alliance with the United States in the war against England and other countries, following the overthrow of the monarchy in 1789. An effort to make such an alliance not only failed, but President Washington persisted in preserving neutrality and the government contracted the Jay Treaty with England, whereby the directory, which then governed France, became offended. It promptly issued letters empowering French vessels to assail American ships, but the President convened Congress in extra session and named John Marshall, Charles C. Pinckney, and Elbridge Gerry as commissioners to treat with France. In the meantime John Adams had succeeded to the Presidency.

Talleyrand, who was then minister of foreign affairs, did not manifest a desire to hold an interview with the Americans, but instead sent Hauteval, Hottinger, and Bellamy as special agents to confer with the commissioners. In the dispatches these agents were designated as X, Y, and Z, hence the whole matter became known as the *X Y Z correspondence,* or *mission.* The French agents in the course of the conference requested a monetary consideration or a loan in order to conclude the matter, but the Americans refused to grant such a demand. It was in this connection that Pinckney is quoted as saying, "Millions for defense, but not a cent for tribute." Shortly after the dispatches were submitted to Congress France ordered Pinckney and Marshall to leave the country and the United States government recalled Gerry. War with France was threatened on account of these matters and a few naval engagements occurred, but Napoleon became first consul of France and was favorably inclined toward the United States. Both countries ratified a treaty in 1800, which was declared in force on Dec. 21, 1801.



Y, the twenty-fifth letter of the English alphabet. It is used both as a consonant and a vowel. The letter *y* was adopted into the Latin from the Greek letter *upsilon,* and afterward became incorporated into the alphabet of the Anglo-Saxons. As a vowel it is now employed regularly for final *i,* as in *city, pity,* and *multiply.* At the beginning of syllables it is usually a consonant, but is a vowel in that case when it is followed by a consonant, as in *Ypsilanti.* It is always a consonant when followed by a vowel. In the Spanish it is used instead of the personal pronoun *I,* and in Latin it is employed only as a small letter. It has no place in the German writings aside from its use in words of foreign origin. *Y,* as a symbol in algebra, stands for the second variable or unknown quantity.

Y, or **Ij,** the portion of the Zuyder Zee which extends north of Amsterdam, in the province of North Holland. Formerly it was 21 miles in length and had a width of several miles, but it has been almost entirely reclaimed for cultivation, except the central part, which has been deepened as a portion of the North Sea Canal. This canal is connected with the Zuyder Zee through a lock.

YABLONOI (yȧ-blȧ-noi′), the name of a range of mountains in Eastern Siberia, in the region east of Lake Baikal. It has a general direction toward the north and northeast, extending a distance of 1,000 miles, and merges into the Stanovoi Mountains. The highest altitudes are in the southwest, where they rise about 8,500 feet above the sea. Their slopes are covered with forests, but the summits are bleak and cold.

YACHT (yŏt), a sailing vessel which is specially built with the view of obtaining speed. Such a vessel is usually designed for pleasure, as for racing or for traveling. Many varieties of yachts are in successful use, ranging from those comparatively small and best adapted for pleasure trips to the seagoing vessels designed for pleasure and racing. In the latter two classes they are supplied with luxurious furnishings. The rigs are various, and many pleasure yachts now have steam power as an accessory or for use during calms. The hull of racing yachts is ballasted quite heavily and they are rigged with large sails, thus supplying the necessaries for considerable speed. Among the chief rigs for yachts are those known as the yawl, cutter, and schooner. The *yawl* has a running bowsprit, one mast, and a small mizzenmast, while the *cutter* is without the last mentioned. The schooner has two masts—a foremast and a mainmast—and either a standing or a running bowsprit. Besides these three classes there are a number of others, and those of each class differ widely as to the sails and lines and the quantity of steam power supplied.

YACHTING, the art of racing and traveling for pleasure by means of a yacht. Yachting has long ranked as an agreeable sport, in racing with yachts and boats with sails, either for pleasure, for money, or for a cup. Competition has caused many improvements to be made in yacht building, just as horse racing has improved horses, and there is an authentic record of yachting clubs for about two centuries. The first sailing club on record, known as the Cork Harbor Water Club and now called the Royal Cork Yacht Club, dates from 1720 and is still the most efficient in Ireland. In the early history of yachting the boats were small, but they gradually increased in size, while other improvements were added to give them both speed and security. The first yacht club in America was founded at New York by nine yacht owners in 1844. At first the main object was to bring the American record up by making improvements in sailing vessels, but later attention turned to competition with foreign yachting clubs.

The schooner *America* crossed the Atlantic in 1851 and won the Queen's cup by defeating the *Aurora.* Several efforts have been made to recover the lost cup, but the United States has held it ever since. The memorable contests embrace that of the *Cambria* against the American schooner *Puritan* in 1870; that of the *Galatea* against the *Mayflower* in 1886; that of the *Thistle* against the *Volunteer* in 1887; and those of the *Shamrock* against the *Columbia* in 1901 and since. The *Shamrock* was owned by Sir Thomas Lipton, of the Royal Ulster Yacht Club, and the *Columbia* by J. Pierpont Morgan, commodore of the New York Yacht Club. In these contests, which are among the most notable on record, the *Columbia* demonstrated in succes-

sive competitive races that the American vessel was superior in every respect for security and speed. At present about 200 famous yachts are maintained in the United States, including, besides those named, the *Defender, Genesee, Vigilant, Gloriana, Katrina, Rainbow, Ramona, Colonia, Virginia, Coronet, Sachem, Minnesota,* and *Amorita.* The races in America are usually sailed off Sandy Hook.

Since 1903 the launches propelled by motors using products of petroleum in place of steam have grown in popularity. The first naphtha launches were set afloat in 1886. To this class belongs the *Adios,* built in 1902 by H. S. Leighton. This launch has a motor of 120 horse power, is 55 feet long, and attained a speed of 23 miles an hour. In some yachts alcohol is used in place of naphtha and electric storage batteries are employed to some extent, especially where the trips are not far from shore, though in some vessels the power is generated by dynamos on board.

The most eventful yacht racing in 1905 occurred in May, when the international transatlantic race from Sandy Hook to the Lizard, England, took place. Emperor William of Germany had offered as a prize the Kaiser's Cup, valued at $5,000, and it was won by the American yacht *Atlantic,* making the trip in twelve days, four hours, and three minutes, the best record for cross-ocean passage of yachts. In September the racing for the Astor Cups took place off Newport, the *Yankee* winning the sloop cup and the *Elmina* winning the schooner cup. Edward VII. offered the King's Cup as a challenge for American yachts. The first race occurred off Newport in August, 1906. Other famous races have been stimulated by the Canada Cup, the Lipton Cup, etc.

YAK (yăk), a bovine ruminant native to Central Asia. It is found chiefly in Tibet, and



DOMESTICATED YAK AND CALF.

is regarded intermediate between the bisons and the true oxen. The yak is still abundant in the wild state in the lofty plateau between the Altai Mountains and the Himalayas, where it subsists on the coarse, wiry grass common to that region. In size it does not differ from a small ox, but there is long hair fringing the shoulders, sides, and tail. Its horns are long, smooth, and nearly cylindrical. The color of wild yaks is either dark brown or black, but those domesticated are lighter in color, even white specimens being quite common, and some are hornless. These animals have been domesticated to a considerable extent in Central Africa for their milk and hair, and they are employed as beasts of draught and burden. The milk is considered very rich and yields a curd valuable for food, both in the fresh and dried state. An excellent grade of butter is made of yak milk. Both the butter and flesh are important articles of commerce in Tibet, while the hair is utilized in making jackets, caps, and blankets, and the skin is of value as a leather product. The tail is used as a chowry, or fly flap, in India and Tartary. The domesticated yak differs quite as much in size, appearance, and usefulness as do the cattle raised in Canada and the United States. It is the inseparable companion and most trusty servant of the Tibetans and is used extensively by the people of Ladakh, Cashmere, Mongolia, and Urga.

YAKIMA, Washington. See **North Yakima.**

YAKIMA (yăk'ĭ-mä), a river of central Washington, which rises in the Cascade Mountains and flows in a general direction toward the southeast. It has a length of about 165 miles and flows into the Columbia some distance above Kennewick. The country along the Yakima includes fine agricultural land, and the river and its tributaries furnish water for irrigating a large region. It receives the inflow from the Natches River near North Yakima. The valley is traversed by the Northern Pacific Railroad almost the entire length.

YAKIMA, a confederacy of Indians in North America, formerly found in the eastern part of Washington, but now confined on the Yakima Reservation, in the south central part of Washington. Lewis and Clark came in contact with them in 1804, and they ceded most of their land to the government by treaty and agreed upon the present reservation in 1855. At present they engage chiefly in stock raising and farming, for which purpose they employ irrigation. The Indians upon the Yakima Reservation number about 2,350, but less than half are Yakimas.

YAKUTSK (yȧ-kutsk'), capital of the province of Yakutsk, in eastern Siberia, on a tributary of the Lena River. The province includes nearly one-third of Siberia and is populated largely by Yakuts, Lamuts, and descendants of those exiled from Russia. It has a remarkably cold climate, the winters being long and severe,

but there is a steady increase in population. The city of Yakutsk is reached in the summer time by vessels sailing on the Lena, Viliui, and Aldan rivers, but in the long winters little commercial activity is manifested. Among the principal manufactures are candles, implements, utensils, earthenware, and clothing. It has a considerable trade in fur, live stock, and native products. Cossacks founded the city in 1632. Population, 1916, 8,604.

YALE, Elihu, philanthropist, born in Boston, Mass., April 5, 1648; died in London, England, July 8, 1721. His father, Thomas Yale, settled at New Haven, Conn., in 1638, but afterward removed to Massachusetts and in 1651 returned to England. Elihu went to India, in 1670, where he established himself in trading. He became governor of the East India Company's settlement at Madras in 1687, serving in that capacity until 1692. In the meantime he acquired a large fortune and returned to England, in 1699. He did not return to America, but became interested in the educational welfare of New England and donated books and money amounting to about $4,000 to the Collegiate School at Saybrook. When that institution was removed to New Haven, its name was changed to Yale College in his honor, and subsequently it became known as Yale University. He was buried in Wexham, Wales. On his tombstone is the familiar couplet:

"Born in America, in Europe bred,
In Africa traveled, and in Asia wed."

YALE, Linus, inventor, born in Salisbury, N. Y., April 4, 1821; died in New York City, Dec. 24, 1868. He first studied portrait and landscape painting, but soon turned his attention to mechanics. In 1850 he invented a key for bankers' safes and the famous Yale lock, which he afterward improved by successive inventions. His clockwork mechanism and combination locks completely revolutionized locks and safes, and gave him a place on the list of American inventors. He made a number of inventions and improvements in mechanics' tools, and perfected a device for adjusting the joiner's square at right angles. Bronze, silver, and gold medals were awarded to him at a number of national and international expositions.

YALE UNIVERSITY, an institution of higher learning in the United States, one of the most noted in America. It was founded as the Collegiate School of Connecticut at Saybrook, Conn., in 1698, but was removed to New Haven in 1716, where it was located permanently. Two years later, in 1718, it was renamed Yale College in honor of Elihu Yale, from whom it received valuable gifts. The consistent growth of the institution as a center of learning naturally caused it to become one of the leading universities of the country. As now organized it includes the graduate department, the academic department, the Sheffield Scientific School, the theological school, the law school, the medical school, the school of music, the school of art, and the school of forestry. The courses are well classified and lead up to the usual university degrees.

The campus of Yale University borders on the green of New Haven, being bounded by Elm, High, Chapel, and College streets. It has a very convenient and imposing location. The buildings include those of the university proper. the Sheffield Scientific School, the School of Fine Arts, the Peabody Museum of Natural History, and the University Library. At present there are 950;000 volumes in the general library. The annual income is about $1,250,000. The general average attendance is 3,500 students. Fully 25,000 persons have graduated from the different departments. In October, 1901, was celebrated the two hundredth anniversary of the granting of a charter to Yale College, on which occasion President Roosevelt and other distinguished men made addresses. Among the eminent men who have been connected with the institution are Timothy Dwight, James L. Kingsley, Theodore D. Woolsey, Arthur T. Hadley, and William Howard Taft.

YALU (yä'lo͞o'), an important river in the eastern part of Asia, known in Corea as the Amnok or Apnok. It rises on the eastern border of China, flows in a general direction toward the southwest, and discharges into the Yellow Sea, forming the larger part of the northwestern boundary of the country. Several rapids obstruct its upper course, but it is navigable a distance of 145 miles, though seagoing junks do not ascend more than 30 miles. The entire course is 300 miles. In the war between Japan and China, the Japanese destroyed the fleet of China off the mouth of the Yalu, in 1894. The Japanese forced a passage of the mouth of this river in 1904, when it was the scene of important battles during the Russo-Japanese War.

YAM, the common name of several species of plants, having twining stems and edible, tuberous roots. The roots are eaten in much the same way as potatoes. They more nearly resemble the sweet potato than the common potato, but differ distinctly from both these products. Starch is the chief constituent and the taste is somewhat acrid when raw, but they become mealy and pleasant when boiled. Yams are cultivated chiefly in the tropical countries and are propagated by their tubers, which are planted in much the same way as potatoes. A light colored kind of sweet potato grown in the Southern States is commonly called yam, but is a different plant. The *cinnamon vine* is an ornamental plant belonging to the yams.

YAMAGATA (yä-mä-gä'tä), **Aritomo, Marquis,** soldier and statesman, born in the province of Choshu, Japan, in 1838. After acquiring a liberal education, he enlisted in the military service, and in 1868 took part in the revolution that overthrew the shogunate and restored the Mikado to power. He was made second vice min-

ister of war by the new government, and in 1869 was sent on missions to France and Russia. In 1878 he became commander of the imperial guard and in 1884 was created a count. He served as prime minister of Japan from 1889 to 1891, and in the latter year was appointed minister of justice. When the late war with China commenced, in 1894, he was made commander of the first army corps, with which he expelled the Chinese from Corea. The Japanese government rewarded him for this service by creating him marquis. He visited the United States and Europe in 1896. In 1898 he was again made prime minister, but resigned in 1900 to retire from public life. Marquis Yamagata was a leading factor in introducing reforms and European methods into Japan. He died Feb. 2, 1922.



ARITOMO YAMAGATA.

YANCEY (yăn'sĭ), **William Lowndes,** orator and statesman, born in Ogeechee Shoals, Ga., Aug. 10, 1814; died July 28, 1863. He obtained the advantages of a college education and was admitted to the bar in South Carolina. In 1836 he removed to Alabama, where he edited the *Catawba Democrat,* and later the *Wetumpka Argus.* He was elected to Congress as a Democrat in 1844 and was reëlected at the succeeding election. In 1860 he attended the Democratic national convention at Charleston, S. C., but withdrew as an uncompromising extremist. Subsequently he traveled through the Southern States as an orator to advocate secession, visiting also many places in the North and East in opposition to the Republican candidates, and in 1861 reported the ordinance of secession in the convention at Montgomery, Ala. The Confederate government sent him to Europe shortly after the beginning of the Civil War as a special agent to secure recognition of the Confederate States by the European powers, but he returned after an unsuccessful mission. On returning to America, in 1862, he became a member of the Confederate Senate, but died a year later near Montgomery, Ala.

YANG-TSE-KIANG (yăng'tsĕ-kĭ-äng'), one of the principal rivers of Asia, which is situated wholly within China. It rises in the Kuen-lun Mountains and, after a general course toward the southeast, makes a bold curve at the northern boundary of the province of Yun-Nan and flows toward the northeast, entering the Yellow Sea at Shanghai. The entire length is 3,200 miles, of which 900 miles are navigable by ships of the largest class and 1,500 miles by smaller steamboats. It is joined by the Han River from the north and by the Kan and Heng rivers from the south. Many important cities of China are located on its banks, and it is the seat of a vast interior and foreign trade. The valley is highly fertile, producing rice, cotton, tobacco, silk, and fruits.

YANKEE (yăn'kĕ), the name popularly applied in the United States to people residing in or coming from New England, but in Canada and Europe it has reference to all the people of the United States. The name originated from a misunderstanding of the word *English* by the Indians, who pronounced it *yanghies* and *yemghies,* and finally coined the word *yankees.* The British soldiers applied it as a term of reproach to the New England troops, in 1775, and they adopted it afterward. In the Civil War it was generally applied to the Northern people by those residing in the Southern States, while the latter became known as *Johnnies.*

YANKEE DOODLE, a popular air which is now regarded as one of the national tunes of the United States. It is thought to have originated in the time of the rebellion in England, when Cromwell was nicknamed Yankee Doodle and the following rhyme was applied to his entry into Oxford:

Yankee Doodle came to town
Upon a Kentish pony;
He stuck a feather in his hat,
And called him Macaroni.

The tune of Yankee Doodle was played by the British troops at the time of the Revolution in derision of the New Englanders, who afterward adopted it as a popular air. It has become superseded quite generally by *America* and *Hail Columbia.* The Legislature of South Carolina, in 1861, enacted a law forbidding its use, it having become highly popular in the North at the beginning of the Civil War.

YANKTON (yănk'tŭn), a city in South Dakota, county seat of Yankton County, on the Missouri River, fifty miles above Sioux City, Iowa. Communication is furnished by the Chicago and Northwestern, the Great Northern, and the Chicago, Milwaukee and Saint Paul railroads. It is finely situated on an elevated site and is surrounded by a fertile farming region. Among the principal buildings are the county courthouse, the Yankton College, the hospital of the Sisters of Saint Benedict, the Saint Joseph Academy, the public high school, and the South Dakota Hospital for the Insane. It has manufactures of flour, earthenware, and utensils, and is the seat of extensive grain elevators and railroad shops. It has a growing trade in farm produce and merchandise. Yankton was settled in 1862 and incorporated in 1883. It was the capital of the Territory of Dakota until the latter year. Population, 1920, 5,204.

YARKAND (yär-känd'), a town of the Chi-

nese Empire, in Eastern Turkestan, on a headstream of the Tarim River, about 100 miles southeast of Kashgar. It is surrounded by a fertile region and protected by a high wall. Most of the houses are of sun-dried brick. The chief buildings include a citadel, an ancient palace, and numerous bazaars and mosques. It has manufactures of silk and cotton goods, woolen clothing, carpets, utensils, and dyestuffs. Formerly it was the center of a vast caravan trade, but the construction of railways in Russian and British territory has lessened its commercial importance. Intercommunication is carried on chiefly by narrow canals that intersect the streets. A larger part of the inhabitants are Chinese, Tartars, and Turks. Mohammedanism is the principal religion. Population, 1917, 85,500.

YARMOUTH (yär'mŭth), a city of Nova Scotia, capital of Yarmouth County, 200 miles southwest of Halifax. It is situated at the entrance of the Bay of Fundy and on the Dominion and Atlantic and the Halifax and Yarmouth railways. The principal buildings include those of the county, the customhouse, the Grand Hotel, and several elementary and secondary schools. The manufactures consist principally of cotton goods, boots and shoes, machinery, and sailing vessels. It has large interests in fishing and canning. During the summer it is visited by a large number of tourists. Population, 1901, 6,430; in 1921, 7,073.

YARMOUTH, or **Great Yarmouth,** a seaport city and watering place of England, 122 miles northeast of London and 20 miles east of Norwich. It is situated conveniently at the mouth of the Yare River, has railroad facilities, and is noted as an important fishing station. The chief buildings include the Church of Saint Nicholas, the Walrond Home, and a number of charitable, benevolent, and educational institutions. It has a fine monument, 144 feet high, erected to the memory of Admiral Nelson. Among the manufactures are cordage, fishing nets, twine, silk and woolen textiles, leather, machinery, and sailing vessels. Fishing is the chief industry. The catches include herring, cod, mackerel, and whitefish. Population, 1921, 55,808

YAROSLAV (yär-ŏs-läf'), a city of Russia, capital of the government of Yaroslav, 165 miles northeast of Moscow. It occupies a fine sight on the Volga, has transportation facilities by the river and several railways, and is surrounded by a fertile farming country. The manufactures include flour and grist, cotton goods, pipe tobacco and cigars, white lead, and machinery. It is the seat of a theological seminary, a college and law school, and a cathedral dating from 1215. Yaroslav was founded in the 11th century and has been under the Russian government since the 15th century. Population, 1916, 73,810.

YARROW (yăr'rō), a river in the southern part of Scotland, in Selkirkshire. It rises at Yarrow Clough, near Loch Skene, and flows into the Ettrick after a course of 25 miles. The current is rapid and furnishes an abundance of water power. Scott and Wordsworth made the stream famous by writing of the picturesque scenery along its banks.

YATES, Edmund Hodgson, novelist and journalist, born in London, England, in July, 1831; died there May 20, 1894. He studied in London and entered the post office service, but retired in 1872 to engage wholly in literary work. After editing the "Temple Bar Magazine," he became theatrical critic for the *Daily News* and contributed to *All the Year Round* and other periodicals. In 1872 and 1873 he made a lecturing tour of Canada and the United States, and soon after published "Personal Reminiscences and Experiences." His writings consist mostly of novels, many of them being interesting and entertaining. The best known works include "Kissing the Rod," "Pages in Waiting," "Wainwright's Patient," "The Impending Sword," "Running the Gauntlet," "Life and Correspondence of Charles J. Mathews," and "Recollections and Experiences."

YATES, Richard, war Governor of Illinois, born in Warsaw, Ky., Jan 18, 1818; died in Saint Louis, Mo., Nov. 27, 1873. His family removed to Illinois in 1831, where he attended Illinois College, Jacksonville, and in 1838 began the practice of law at Springfield. In 1842 he became a member of the State Legislature, serving until 1849, when he was elected to Congress as a Whig, being the youngest representative in that body. He was elected Governor of Illinois in 1860 and reëlected in 1862. As a war Governor he took high rank as an enthusiastic supporter of the Federal cause, aided in raising troops, and was among the first to recognize the military ability of U. S. Grant. He served as United States Senator from 1865 until 1871, and was chosen railroad commissioner shortly before his death. His son, Richard Yates (born in 1860), was elected Governor of Illinois as a Republican in 1901, serving until 1905.


RICHARD YATES.

YATES, Robert, jurist, born in Schenectady, N. Y., March 17, 1738; died in Albany, N. Y., Sept. 9, 1801. He attended school in New York City, studied law under William Livingston, and was admitted to the bar in 1760. Shortly after he settled in Albany, where he was chosen a member of the Provincial Congress, in 1775, and during the Revolution advocated the American cause by contributing articles to various periodicals and delivering numerous addresses. He was chief justice of the New York supreme court from 1790 to 1798 and subsequently served on commissions to settle disputes between New

York and Massachusetts in regard to territory. Later he was a commissioner in similar disputes between New York and Vermont.

YAWS (yąs), the name of a contagious disease which is more or less prevalent in warm countries. Many local names are applied to it in different localities, such as tonga, bubas, and coko. The patient is generally covered with yellowish tubercles or granules, which may appear on any part of the body, and the period of the disease is from two to five months, but it may continue many years. Some consider it a form of leprosy. Mercury, arsenic, and sulphur are the principal drugs used in treating the disease. Yaws is a common malady in the West Indies, Ceylon, the East Indies, and the warmer parts of Africa and South America.

YAZOO (yăz′o͞o), a river in Mississippi, which rises in the northern part of the State, near Friarpoint, from several bayous thrown off by the Mississippi River. Later it is joined by the Yalobusha and the Tallahatchie and, after a general course toward the southwest, it flows into the Mississippi ten miles above Vicksburg. It is about 300 miles long and has a rather tortuous course, but is navigable at all seasons. Fertile cotton plantations are located along its banks. Yazoo City is the chief city on its banks.

YAZOO CITY, a city of Mississippi, county seat of Yazoo County, on the Yazoo River, 45 miles northwest of Jackson. It is on the Yazoo and Mississippi Valley Railroad and is surrounded by a fertile farming country, which produces large quantities of corn and cotton. The industries include lumber mills, machine shops, and cotton mills. It has several fine buildings, including the county courthouse and a number of schools. Population, 1920, 5,244.

YEAR, the period of time in which the earth completes a revolution around the sun, or in which the seasons pass through their changes. Owing to the fact that this period is not an exact number of days, there are many kinds of years, each differing somewhat in length. The period between two passages of the sun through the same equinox, which determines the changing seasons, is called the *solar, tropical,* or *equinoctial* year, and is constituted of 365 days, 5 hours, 48 minutes, and 48 seconds. The *sidereal* year, in which the sun apparently returns to the same stars, is equal to 365 days, six hours, nine minutes, nine seconds. It differs in length from the tropical year, owing to the precession of the equinoxes among the stars. The *common year* of 365 days, the integral number of days nearest to the solar year, is in popular use, and every fourth year is a *leap-year* of 366 days, except the centuries not exactly divisible by 400, as 1800 and 1900. Other years include the *civil year* of 365 days, the *lunar year* of twelve lunar months, and the *ecclesiastical year* counted from Advent to Advent.

YEAST, a fungus growth consisting of minute vegetable cells that collect and form a frothy substance of a yellowish color. When placed in contact with saccharine liquids, it develops or increases by germination, producing alcoholic fermentation and carbonic acid. Yeast is employed chiefly in the brewing of beer and the raising of bread. In the former it imparts the sparkling and stimulating qualities to the beer, while the carbonic acid causes porosity in the bread. A quantity of yeast is mixed with the dough, which is allowed to stand and rise for some time, and the dough is then made into loaves. The action of yeast is to produce a small quantity of alcohol and carbonic acid from the sugar present in the dough, the rising being due to the escaping carbonic acid. Yeast is now used very largely in all classes of bakery, although in the East, as in former times, *leaven* is still employed to a considerable extent. In Canada, the United States, and many countries of Europe *yeast powders,* or *baking powders,* are used very extensively as a substitute for yeast in bread making.

YEATS, William Butler, critic and poet, born at Dublin, Ireland, June 13, 1865. He attended schools in Hammersmith and Dublin, making a specialty of the study of art, but in 1886 turned his attention to literature. Being agreeably Irish as a writer, he awakened interest in the literature of Ireland and aided in founding the National Literary Society of Dublin. He visited Canada and the United States in 1903 and delivered a number of lectures. His chief works include "Countess Kathleen and Various Legends and Lyrics," "The Shadowy Waters," "Ideas of Good and Evil," "Wind Among the Reeds," "In the Seven Woods," and "The King's Threshold." He died Feb. 3, 1922.

YEDDO. See **Tokio.**

YELLOW (yĕl′lō), the color of the solar spectrum which is between the orange and the green. It is best represented by the lemon and canary yellow, and is the color of gold and of brass. Violet and yellow are complementary to each other, that is, if these two colors are mixed they will produce white light. Blue is made paler by increasing the light to which it is exposed, but an increase of light seems to strengthen the color of yellow.

YELLOW BIRD, an American bird of the finch family, which is widely distributed in North and Central America. It is about six inches long, with an alar extent of nine inches. The male has a bright yellow plumage in summer, while the female is yellowish-brown. A number of species have been catalogued, all of which are birds of pleasing song and are favorites as cage birds. They feed on insects and seeds, and in autumn gather in large flocks.

YELLOW FEVER, an acute, specific disease, which is epidemic in tropical countries. It was first made known to Europeans in the 15th century in connection with the discovery of America, and was so named from the yellow appearance of the skin seen in patients. Yellow

fever is thought to be caused by a specific virus, which becomes complicated with jaundice conditions, and at an advanced stage is accompanied by the vomiting of dark-colored matter called *black vomit.* It depends for its origin and diffusion on a temperature not lower than 70° Fahr., and its spread immediately stops when the atmospheric temperature falls to the freezing point.

In 1895 J. Sanarelli, of Montevideo, Uruguay, published the opinion that yellow fever is a toxic disease, induced by a poison generated by the bacillus *icteroides,* to which he gave the name *amaril.* Subsequent investigations of many yellow fever patients have confirmed that view. Infection takes place when the blood of a yellow fever patient is injected into healthy persons. Horses, cattle, monkeys, rats, and many other animals are subject to it. An antitoxic serum has been obtained by inoculating horses and oxen with virulent toxin, and it is thought that medical science will soon be able to apply effective treatment to this much dreaded contagion. However, wholesome sanitary measures, such as were introduced in the Panama Canal zone by the United States, are the most effective preventives.

In 1878 a very fatal epidemic of yellow fever ravaged New Orleans, continuing from May to October, and 4,125 persons succumbed to its attacks. The disease is most prevalent in Central America, the West Indies, portions of Mexico, and the tropical countries of Africa. It is frequently carried to the gulf states and other sections of America. An epidemic prevailed in Cuba, Brazil, Mexico, and Central America in 1900. In 1905, during an epidemic at New Orleans, it was clearly shown that the bites of a certain species of mosquitos, the *Stegomyia fasciata,* are the cause of spreading the disease. This accounts for the fact that the appearance of a frost causes it to abate or to be stamped out entirely.

YELLOW-HAMMER, a common European bird of the bunting family. It is about seven inches long, has an expanse of wings of eleven inches, and the male has a bright yellow head and throat. This bird is common in the wooded districts of all parts of Europe and during the winter is seen with the finches and sparrows. The name yellow-hammer is applied to the flicker, or golden-winged woodpecker, in the United States.

YELLOWLEGS, the name of two species of snipes found in North America, especially along the Atlantic coast. The *common yellowlegs* is ten inches long and is much prized for its flesh. The *greater yellowlegs* is somewhat larger. These birds migrate north as far as Nova Scotia, and in autumn pass south to the West Indies and South America. Hunters sometimes call them *tatlers,* or *yelpers,* owing to their peculiar noise when flying from danger.

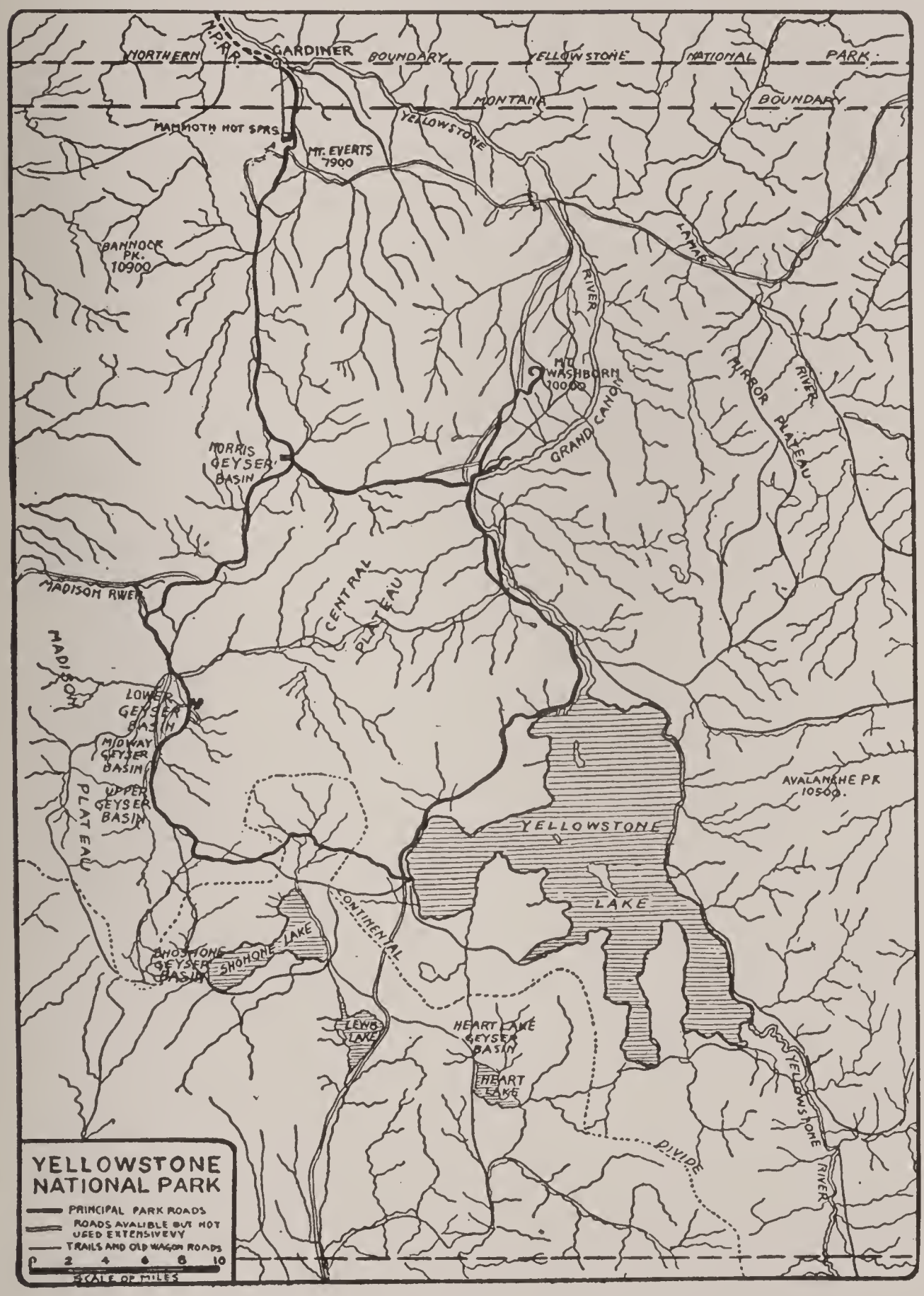
YELLOW SEA, an extensive inlet of the Pacific Ocean, lying between Corea and China and merging into the Gulf of Pe-chi-li. It is 600 miles in length and 400 miles wide, and is largely a shallow expanse of the sea. This is due to the large amount of silt carried into it by the Yang-tse-Kiang and Hoang-ho rivers. Shanghai, Kiao-chau, and Seoul are the chief cities on the Yellow Sea, and Port Arthur and Tien-Tsin are on the Gulf of Pe-chi-li. It has valuable fisheries and is important for its commerce.

YELLOWSTONE, a river of the United States, which rises in Yellowstone Lake, a fine sheet of water in the northwestern part of Wyoming. It has a general course toward the north until reaching Livingston, Mont., where it assumes a northeasterly direction and flows into the Missouri near the boundary of North Dakota. The chief tributaries are the Powder, Big Horn, and Tongue rivers, all of which rise in Wyoming. The Yellowstone is 625 miles long and a portion of this distance is navigable for small vessels. A number of beautiful cañons are situated in its upper course, especially the Grand Cañon, which is 1,500 feet deep. Near the exit of the river from the lake is a belt of hot springs three miles long and a half of a mile wide. About fifteen miles below the lake the river plunges over two precipices, the upper being 112 feet high and the lower 310 feet high. Yellowstone Lake is 7,375 feet above sea level and has an area of 300 square miles. Its shores are picturesque, being characterized by rugged cliffs, and it has excellent trout and other fisheries.

YELLOWSTONE NATIONAL PARK, the most wonderful natural park in the world, which is situated in the northwestern part of Wyoming. A small strip along the eastern side is included with Idaho and a tract in the northern part belongs to Montana. The reservation was set apart as a public park by the national government in 1872. It has an area of about 3,575 square miles, is 62 miles in length from north to south, and has a width of 54 miles. Near it is the Yellowstone Park Forest Reserve, which adjoins the park on the south and the east, increasing the area to 5,500 square miles.

The park has an abundance of rainfall, thus giving it beautiful ponds and lakes, numerous streams, and excellent vegetation. Yellowstone, Shoshone, Lewis, and Heart lakes are the chief bodies of water, and the principal drainage is by the Yellowstone River. The Madison River, a tributary of the Missouri, drains the eastern part, and the Snake River, a tributary of the Columbia, has its source in the southern part. This park contains some of the most beautiful natural curiosities in the world, including about 25 waterfalls, 100 geysers, and 4,000 hot springs. Many of the springs are laden with minerals, such as the Mammoth Hot Springs, which are situated near the northern entrance to the park. Although the general surface ranges from 6,980 to 8,500 feet above the sea, 24 peaks exceed an altitude of 10,000 feet.

The Grand Cañon of the Yellowstone, with its vast volume of water rushing at great depths; many snow-capped mountains, towering about 10,000 feet above sea level; the Grand, Old Faithful, Giant, Giantess, and Bee-Hive geysers; and numerous cascades and waterfalls are among the natural curiosities to be viewed by the tourist. In this great natural zoölogical garden are



MAP OF YELLOWSTONE NATIONAL PARK.

beautiful forests, in which are protected herds of buffalo, deer, elk, antelope, and other animals. Tourists often marvel at the peculiar tameness of the animals in the park, especially the bear, which is due to the fact that they receive marked care and are under protection of the laws of the United States. The government has planted German, brook, and rainbow trout, whitefish, and other species in the lakes and rivers, thus giving travelers an excellent opportunity to find recreation in angling.

The park is reached most conveniently from Livingston, Mont., by the Northern Pacific Railway, which has its terminus at Gardiner, a small town at the northern boundary of the park. The main entrance is through a stone arch built by the Federal government, which bears the inscription, "For the Benefit and Enjoyment of the People." Other gateways are reached from Cody, Wyo., on the east, and from Monida, Idaho, on the west. Many beautiful walks and drives are maintained in the park, with fine villa and hotel accommodations. Adequate protection to tourists is provided by the government. Transportation companies convey the tourists by carriages in regular trips through the park, the principal points of which may be visited in six days. June and July are the most favorable touring months.

YEMEN (yĕm'ĕn), a region in the southwestern part of Arabia, constituting a villayet or province of the Turkish Empire. It is bounded on the north by Hedjaz, east by Arabia, south by the British protectorate of Aden, and west by the Red Sea. The area is about 74,500 square miles, but in a larger sense the section includes all of the region lying between Syria and the Strait Bab-el-Mandeb. It has a hilly and mountainous surface, but the valleys are rich in tropical and subtropical vegetation. The coast is hot and arid in some parts of the year. Stock raising is the principal occupation, but the country produces large quantities of coffee and fruits. Yemen was made a part of Turkey in the 16th century. It belonged to the Arabs from 1630 until 1872, and since then it has remained a part of the Ottoman Empire. Medina and Mecca are the principal and most noted towns of Yemen. Sana, in the southern part, is the

nominal capital and Hodeida and Loheia are the chief ports. Population, 1915, 750,500.

YEN, a coin of Japan, the monetary unit of that country. It was minted in both gold and silver until 1897, when the gold standard was adopted, and since that time it has been coined chiefly in larger denominations than the single yen. The value of the gold yen is about $0.99 and of the silver yen, about $0.52. Coins in the denominations of 20 yens in gold, equal to $9.97, are circulated more generally than the smaller denominations. A yen is divided into 100 *sens,* which are coined in bronze. The coin of 5 sens is coined in nickel; the 10-sen, the 20-sen, and the 50-sen pieces are in silver. The sen is divided into 5,000 *rin,* and this is coined in bronze in the denomination of 5 rins.

YENIKALE (yĕn-ē-kȧ-lā′), **Strait of,** a narrow passage which separates the western extremity of the Caucasus from the Crimean Peninsula and forms the connection between the Black Sea and the Sea of Azov. The strait is 25 miles long and about three miles wide at its narrowest place. It contains numerous shoals. In the central part is an expansion, known as the Harbor of Kertch, and the stretch south of it is usually called the Strait of Kertch.



GRAND GEYSER.

YENISEI (yĕn-ē-sā′ē), an important river of Asia, which rises in northern China by two branches, the Bey-Keme and the Onlon-Keme, and flows into the Gulf of Yenisei, an inlet of the Arctic Ocean. The upper course is toward the west, but it assumes a general course toward the north near the boundary of Siberia and, after receiving the Upper Tunguska, flows toward the northwest. A number of falls and rapids are in its upper course, but the larger part of it is through great steppes and it receives numerous tributaries. It is navigable only in the summer months, owing to the cold climate. It has a total length of 3,000 miles. The basin contains 1,100,000 square miles. The Angara River, which merges into the Upper Tunguska, is the outlet of Lake Baikal. The Yenisei is navigable to Turukansk.

YERKES, Charles Tyson, capitalist, born in Philadelphia, Pa., June 25, 1837; died Dec. 29, 1905. He attended the public schools in Philadelphia, began business as a clerk in the grain commission trade, and in 1858 opened an office as an exchange broker. In 1861 he went into the banking business, dealing extensively in bonds, and in 1871 failed in business and was forced to make an assignment. Having dealt in bonds of the city of Philadelphia and being in debt for a large amount, he was convicted of misappropriating public funds and for a time was in prison, but afterward it was decided that the conviction was illegal. He gained financial advantage by the failure of Jay Cooke in 1873 and invested in the street railways of Philadelphia. In 1886 he secured control of the North Side and the West Side street railroads and the elevated railway corporations of Chicago, which he improved and enlarged. As a director of the World's Columbian Exposition, Chicago, he rendered efficient service and made a loan of his private collection of paintings to the department of fine arts. Subsequently he financed and managed an extensive line of underground railways in London. He made a gift of $400,000 to the University of Chicago, to establish at Lake Geneva, Wis., the Yerkes Observatory, one of the most famous institutions of the kind in the world.

YESSO (yĕs′sō), **Jesso,** or **Yezo,** the most northerly of the principal islands included in Japan. It is separated from Hondo by Tsugaru Strait. The island is mountainous and volcanic, but has excellent timber and fine minerals. Mount Tokachi-dake, height 8,210 feet, is one of the most elevated peaks. The Ishikari, length 407 miles, is the chief river. Among the minerals are gold, silver, iron, and coal, and there are valuable fisheries in its streams and off the coasts. Sheep, cattle, horses, and cereals are grown in abundance. Yesso has an area of 36,299 square miles and a population of 926,582. Hakodate is the chief city and the capital.

YEW (ū), an evergreen tree with spreading branches, solid and massive trunk, and dense, dark green foliage. Naturalists have catalogued many species, all of which yield wood of a fine, close grain, which is very durable and valuable for architectural and manufacturing purposes. Many species are now cultivated, especially as ornamental trees, either for separate growth or for hedges. The best known species include the *California yew, Mexican yew, Irish yew,* and *Japan yew.* Yew trees have a slow growth and a long life, some species attaining an age of 300 to 500 years, and the leaves contain a potent narcotic principle. The yew tree is commonly called hemlock, and the poisonous properties are referred to in the classical writings of Virgil,

Livy, Plato, and Caesar. Though poisonous to some extent when in a state of growth, the leaves develop a larger per cent. of poison when undergoing fermentation in large piles or heaps.

YGDRASIL (ĭg′drȧ-sĭl), in Scandinavian mythology, the name of the most sublime of all trees, the ash, whose branches were supposed to reach from earth to heaven. It was regarded the symbol of the universe. The fountain of wisdom was beneath one of its roots, and under its bows was a familiar meeting place of the gods. Some writers regard it as the source of the Christmas tree.

YIDDISH, the language spoken by a large proportion of the Jews, but particularly in the eastern part of Europe. The name is from the German word *jüdisch,* meaning Jewish, and applies to the most widely spoken dialect of the Jewish people. German was spoken and written with facility by the Jews in Germany up to the 14th century, when large numbers migrated to the Slavic lands in the eastern part of Europe, to which they brought the German language as spoken at that time. Later the German underwent many changes through the influence of Luther and the development of a larger literature, hence, when the Jews returned to Germany in the 17th and 18th centuries, they continued to speak a vernacular which was based on the German of the Middle Ages. However, many of the newer words were intermingled with the spoken tongue and a large number of Hebrew terms continued to be used, which resulted in finally developing a characteristic but largely German dialect. Ultimately this language was carried to all parts of the world where the Jews of this class founded homes. It is now heard in practically all the Ghettos in America and Europe. The literature of this language is very extensive.

YOKOHAMA (yō-kō-hä′mä), a large port city of Japan, in the island of Hondo, eighteen miles southwest of Tokio. It has good railroad facilities and a commodious harbor on Tokio Bay, and is noted as a trade and manufacturing city. The chief buildings include the customhouse, several institutions of higher learning, the official residences, and a number of temples and synagogues. Among the principal manufactures are embroidery, clothing, porcelain, leather, silk and woolen textiles, soap, edged tools, hardware, and machinery. Many of the streets are paved substantially and are improved by avenues of trees, drainage, and gas and electric lights. An extensive system of rapid transit has been introduced recently under government sanction. It has a large trade in rice, silk, woolens, tea, cotton, and porcelain. The edifices include several Christian churches, many fine schools, and a large number of temples. Yokohama is a modern city and owes its importance to a treaty whereby the port of Tokio became open to foreign trade in 1859. At that time it was only a small fishing village and the chief business was transacted at Tanawaga, but the latter was soon after abandoned and Yokohama grew rapidly in population and commercial importance. The harbor is now protected by a granite breakwater. It has extensive docks and wharves. Population, 1916, 392,684.

YOKOSUKA (yō′kō-sōō′kȧ), a seaport and naval station of Japan, on the western shore of the Bay of Tokio, twelve miles south of Yokohama. It has a fine harbor on the Bay of Yedo and is connected by railways with the leading cities of the island of Hondo. The chief industries include shipbuilding, machine shops, brick and pottery works, and flour and grist mills. It has a number of fine schools and several temples of considerable size. Electric lighting, waterworks, and sewerage systems are maintained. Population, 1918, 31,246.

YONGE (yŭng), **Charlotte Mary,** novelist, born at Otterburn, England, in 1823; died March 24, 1901. Her parents gave her a careful education under private tutors at home, fitting her for a successful literary career. She was editor of the *Magazine for the Young* a number of years and edited the *Monthly Packett* more than a quarter of a century. Many of her novels were first published in these periodicals and her total productions were issued in about 125 volumes, devoted chiefly to historical and educational themes. The best known of her novels is "Heir of Redclyffe," which is characterized by a religious and spiritual sentiment. Other works from her pen are "Catherine of Aragon and the Sources of the English Reformation," "Life of the Prince Consort," "The Daisy Chain," "The Dove in the Eagle's Nest," and "Life of Hannah More."

YONKERS (yŏn′kẽrz), a city of New York, in Westchester County, on the Hudson River, and on the New York Central Railway, ten miles north of New York City. It is situated on a beautiful site elevated about 415 feet above the river, has extensive electric street railway facilities, and is a popular residence of New York business men. The principal buildings include the public library, the Federal post office, the city hall, the Saint John's Riverside Hospital, the Woman's Institute Library, the Saint Joseph's Seminary, the Hebrew Home for the Aged and Infirm, and the Greystone House, which was once the residence of Samuel J. Tilden. Among the manufactures are textiles, lead pencils, carpets, hats, sugar, steam engines, clothing, machinery, and farming implements. The city has a large trade in farm produce and merchandise. Yonkers was settled by the Dutch in 1650. The ground upon which it stands was included in the Philipse Manor from 1672 to 1779. It was organized as a township in 1778 and became a village in 1855. In 1872 it was incorporated as a city. Population, 1905, 61,716; in 1920, 100,176.

YORK, a city in Nebraska, county seat of York County, on the Chicago and Northwestern

and the Chicago, Burlington and Quincy railroads, fifty miles west of Lincoln. The surrounding country is fertile, producing cereals, vegetables, hay, and fruits. Among the principal buildings are the county courthouse, the high school, the public library, the School of the Holy Family, and the York College, a United Brethren institution. Telephones, electric lighting and waterworks are among the improvements. York was settled in 1871 and incorporated in 1880. Population, 1920, 5,388.

YORK, a city of Pennsylvania, county seat of York County, 28 miles southeast of Harrisburg, on the Wabash, the Pennsylvania, the North Central, and other railroads. The surrounding country is agricultural and dairying. Among the chief buildings are the handsome granite courthouse, the York County Academy, the high school, the Federal building, the city hall, the opera house, the public library, the orphans' home, and the York Collegiate Institute. Penn and Farquhar parks are fine public resorts.

York has a large trade and is important as an industrial center. It has manufactures of boots and shoes, railway cars, furniture, tobacco products, clothing, machinery, and hardware. The city has well-paved streets, electric and gas lights, electric street railways, waterworks, and other municipal improvements. It was founded in 1741 and was the seat of the Continental Congress in 1777, when the British occupied Philadelphia. The place was incorporated as a borough in 1787 and as a city in 1887. Population, 1900, 33,708; in 1920, 47,512.

YORK, a river in Virginia, which is formed by the junction of the Mattapony and Pamunkey rivers, constituting an estuary forty miles long and from one to three miles wide. Eleven miles from its mouth is Yorktown, which was the scene of the surrender of Lord Cornwallis, on Oct. 19, 1781. At its mouth is a noted lighthouse.

YORK, a city of England, in Yorkshire, at the junction of the Foss and Ouse rivers, about eighteen miles northeast of Leeds. The city is the converging center of several important railroads and is surrounded by a fertile farming and dairy region. Among the chief buildings are the cathedral, the archbishop's palace, the Saint Peter's School, a school for the blind, and numerous other educational, benevolent, and charitable institutions. Its cathedral, known as the York Minster, was founded in the 7th century. It has a tower 213 feet high. Many of the streets are narrow and antique in appearance, but the main portion of the city is paved substantially and has gas and electric lighting, sewer drainage, telephones, and rapid transit. Among the manufactures are glass, flour, leather, confectionery, spirituous liquors, ironware, clothing, and machinery. York ranks as one of the oldest cities in England and there are evidences that it had considerable importance before the Roman invasion. It was the chief seat of Hadrian and the death place of Severus. Henry II. made it the seat of the first English Parliament, in 1160. James II. took away its charter, in 1688, for its opposition to his policies. Population, 1921, 82,297.

YORK, George Frederick Ernst Albert. See **Prince of Wales.**

YORK, House of, a dynasty of English kings, which was founded by Richard, Duke of York. He claimed the throne in opposition to Henry VI., who had been crowned king, as a representative of the Lancaster line and ultimately took up arms, the wars that followed being known as the *Wars of the Roses*. By virtue of a compromise it was agreed that Henry should remain king until his death, and that the succession should then pass to Richard and his heirs. Queen Margaret repudiated this compromise and Richard took up arms, but was slain in the Battle of Wakefield. The Wars of the Roses finally terminated in favor of the Yorkists and Richard's son, Edward IV., was proclaimed king in 1461. He reigned until 1483, when his eldest son, Edward V., succeeded him, but was murdered two and a half months later by his uncle, Richard III., who was slain in the Battle of Bosworth in 1485. The Tudor dynasty then succeeded to the throne in the person of Henry Tudor, Earl of Richmond, who united the houses of York and Lancaster by marrying the daughter of Edward IV., and was crowned as Henry VII.

YORKTOWN, a town and the county seat of York County, Virginia, on the York River, eleven



SIEGE OF YORKTOWN IN 1781.

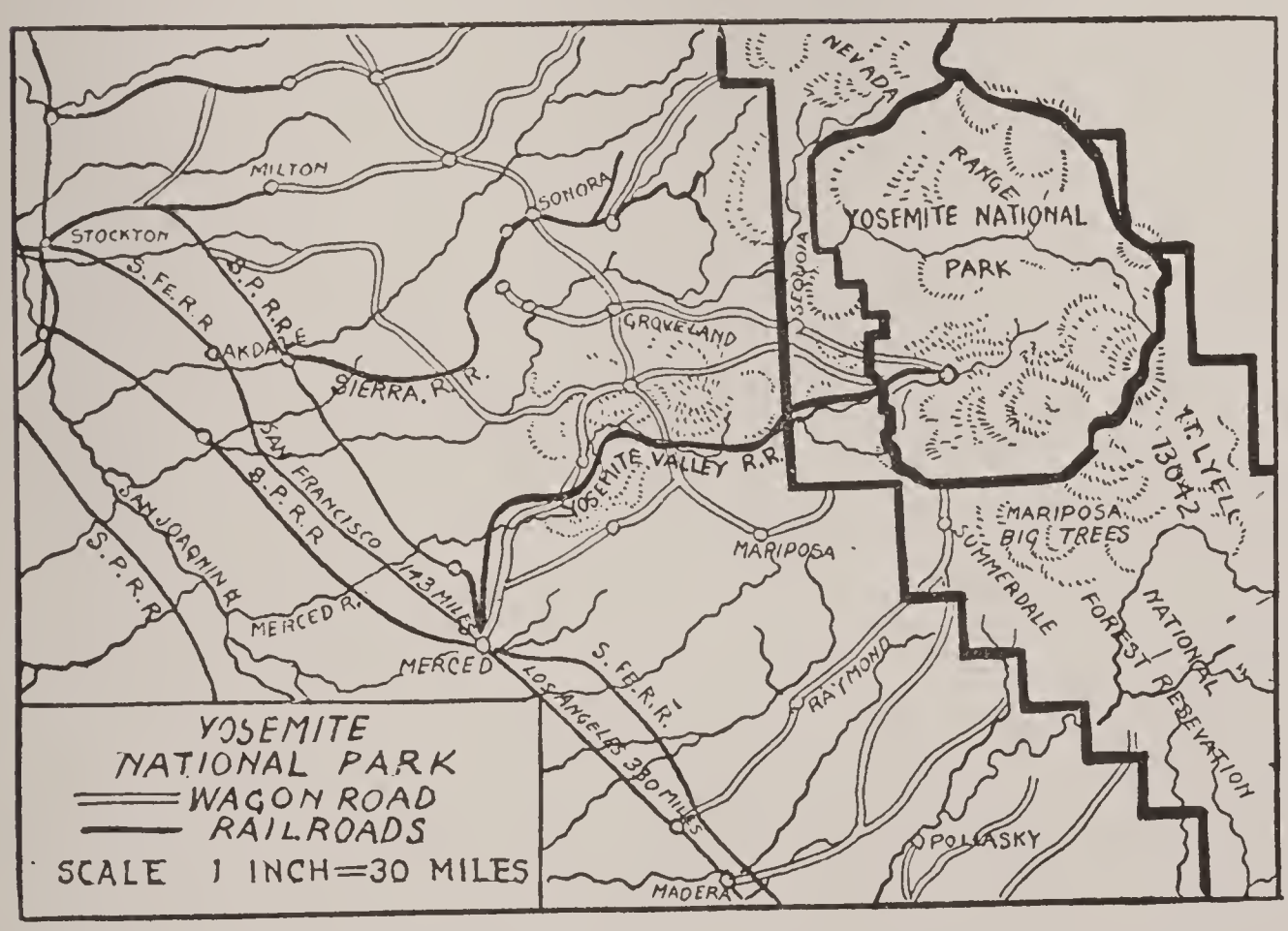
miles from its mouth and sixty miles southeast of Richmond. Communication is furnished by several steamship lines. The features include the customhouse, the county buildings, and several schools and churches. It was platted as a town in 1705 and at one time had considerable

importance as a commercial center, but the Revolution and the Civil War left it in a ruined condition.

Yorktown is noted for two famous sieges, one in the Revolution and one in the Civil War. On Oct. 19, 1781, the British troops under Lord Cornwallis surrendered at Yorktown to the Americans under Washington. The British had possession of Yorktown and defended it with 8,000 men, while the American army under Washington consisted of 9,000 men and the French troops under Lafayette numbered 7,000. This surrender practically ended the Revolution. The second siege of Yorktown took place in 1862, when the Confederates under General Magruder held the place, but that commander was superseded by General Johnston, who commanded an army of 53,000 men. General McClellan besieged the place with an army of 120,000 men, but the Confederates succeeded in withdrawing their forces. In 1879 a fine monument of the Corinthian style was erected at Yorktown to commemorate the surrender of Cornwallis. Population, 1920, 155.

YORK VON WARTENBURG, Hans David Ludwig, noted soldier, born in Potsdam, Germany, Sept. 26, 1759; died Oct. 4, 1830. He attended several schools and gymnasiums and enlisted in the Prussian military service. Subsequently he entered the army of Holland for service in India, where he remained from 1783 until 1784. He became major general in the Prussian army in 1807, was captured by the French in the Battle of Lübeck, and in 1812 commanded a detachment of Prussian troops against Napoleon in his Russian campaign. In 1813 he defeated Eugene de Beauharnais at Dannigkow and at Bautzen covered the retreat of the allies. He distinguished himself in the Battle of Katzbach and defeated Bertrand at Wartenburg, for which he was made a count. Subsequent to the return of Napoleon from Elba he took a leading part with the German army, and in 1821 was made field marshal. At Berlin is a fine statute of him by Rauch.

YOSEMITE (yō-sĕm′ĭ-tē), a famous and beautiful valley in Mariposa County, California, 150 miles southeast of San Francisco. It rivals in grand and magnificent scenery the Yellowstone National Park and is famed for its purling brooks, bubbling waterfalls, splendid foliage of trees, and gayly decked birds of song. The valley is seven miles long and about a mile wide, but its boundary lines wind in and out among the adjacent mountains, which rise to heights of from 4,500 to 5,280 feet. Among the beautiful and scenic places are those known as Sentinel Rock, 2,275 feet high, Cathedral Rock, the Spires, the Three Brothers, the Cloud's Rest, and the Bridal Veil Falls. This falls drops 2,660 feet by three plunges and is counted among the most beautiful in the world. Through the valley flows the Merced River, forming not only the Bridal Veil Falls, but several others of great beauty, the whole series constituting a sublime panorama of nature.



Tourists from all parts of the world are attracted to the Yosemite valley, not only because of its grand scenery, but also because of its mild and beautiful climate and the great forest trees growing in the valley and in its vicinity. The valley was first discovered by white men in 1855. An act of Congress, passed in 1864, transferred the valley to the State of California with the condition that it should always remain a public resort. However, since 1890 it has been known as the Yosemite National Park. A large part of the adjacent country is included in the National Forest Reserve, which contains the big trees of Mariposa. Tourists find the period from May to September the most agreeable for visiting the valley. A place known as Inspiration Point, near the entrance, is counted the most beautiful situation from which to obtain a general view. The gateway of the park is reached by the Yosemite Valley Railroad, which communicates at Merced with the Southern Pacific and the Atchison, Topeka and Santa Fé railways.

YOUMANS (yo͞o′mąnz), **Edward Livingston,** scientist, born in Coeymans, N. Y., June 3,

1821; died in New York City, Jan. 18, 1887. He attended the public schools in Saratoga and afterward studied medicine and chemistry. In 1852 he published his first text-book in science, but subsequently devoted nearly twenty years to the study of scientific subjects and to writing texts on those and related topics. He established the *Popular Science Monthly,* in 1872, in New York City, of which he was editor and manager until his death. The University of Vermont conferred the degree of medicine upon him. His chief writings include "Correlation and Conservation of Force," "Alcohol and the Constitution of Man," "Culture Demanded by Modern Life," "Class Book of Chemistry," "Handbook of Household Science," and "Chemical Atlas."

YOUNG, Brigham, celebrated Mormon leader, born at Whitingham, Vt., June 1, 1801; died in Salt Lake City, Utah, Aug. 29, 1877. He



BRIGHAM YOUNG.

was the son of a farmer, spent his early life in pursuing agricultural arts, and obtained the advantages of a common school education. Later he learned the trade of a painter and glazier, but devoted himself diligently to self-improvement by cultivating studious habits. In 1831 he was converted to Mormonism and soon became an intimate associate of Joseph Smith. He joined the settlement at Kirtland, Ohio, in 1832, was made one of the twelve apostles in 1835, and was chosen president and prophet on the death of Joseph Smith in 1844. When the Mormons were forcibly expelled from Nauvoo, Ill., he faced the difficulties with remarkable fortitude and led the larger part of the Mormons over the great plains and across the Rocky Mountains to Great Salt Lake, where he founded Salt Lake City in 1847.

By reason of remarkable perseverance and determination the mountain streams were conducted across the valleys and lowlands to irrigate the soil, and the region of Great Salt Lake was converted from a desert waste to a country productive and fertile. In 1849 he organized a State government, which he named the State of Deseret, but the United States authorities refused to sanction the new State. Utah was organized as a Territory in 1850 and Young served as Governor until 1854, when a gentile was appointed to succeed him in that office. A series of troubles arose which resulted in the government sending troops, thus compelling obedience to the Governor appointed by Federal authority. Young promulgated the so-called celestial law of marriages in 1852, which he claimed had been revealed to Joseph Smith, and accordingly instituted polygamy. This resulted in a large party leaving the organized church and establishing a branch that repudiated plural marriages. He is said to have had 19 wives and about 56 children. His fifteenth wife began proceedings in court for a divorce in 1875. Seven widows and 44 children, 16 sons and 28 daughters, survived him. Young was a man of remarkable strength of character, great shrewdness, and undoubted ability. His energy and thrift is not only exemplified by his large personal and religious following, but by the cities and institutions existing on account of his persistent efforts. He founded the beautiful Mormon temple in Salt Lake City, encouraged agriculture, developed manufactures, and promoted the building of several railroads. About 30,000 persons attended his funeral, which was celebrated with imposing ceremonies.

YOUNG, Charles Augustus, astronomer, born at Hanover, N. H., Dec. 15, 1834. He studied at Dartmouth College and became a teacher at Phillips Academy, Andover, Mass., in 1854. The following year he took up the study of theology at Andover Seminary and in 1856 became professor of mathematics and natural philosophy in Western Reserve University, Ohio, but the following year accepted the professorship of astronomy and natural philosophy at Dartmouth. He accepted the chair of astronomy at the College of New Jersey, Princeton, in 1877. He made many discoveries in astronomy, including the spectrum of the corona and the presence of sulphur and strontium in the sun. His books include "Elements of Astronomy," "The Sun," "Uranography," and "Manual of Astronomy."

YOUNG, Edward, author, born in Upham, England, in 1684; died April 12, 1765. He studied at Winchester School and at Oxford, and afterward became tutor in the family of the Earl of Exeter. His writings consist mostly of poems and tragedies, and many expressions taken from them have passed into proverbs, including such as "All men think all men mortal but themselves" and "Procrastination is the thief of time." Among his best known works are "Night Thoughts on Life," "Force of Religion," "Love of Fame," and "Poem on the Death of Queen Anne."

YOUNG, John Russell, journalist, born in Downington, Pa., Nov. 20, 1841; died in Washington, D. C., Jan. 17, 1899. He studied in the public schools of Philadelphia and New Orleans, and in 1857 entered the office of the Philadelphia *Press* as copy boy. At the beginning of the Civil War he joined the army of the Potomac as correspondent, and in 1864 accompanied General Banks on the Red River expedition. He settled in New York City after the close of the war and contributed to the New York *Tribune,* but resigned after three years to be admitted to the New York bar. In 1870 he established the New York *Standard,* which was not a financial success, and the following year went to Europe

as a correspondent of the New York *Herald*. He accompanied General Grant on his tour of the world as correspondent from 1877 to 1878 and later published "Around the World with General Grant." In 1882 he was appointed minister to China by President Arthur and, on returning to the United States, in 1885, became connected with the Philadelphia *Star*. President McKinley appointed him librarian of Congress in 1897, which position he filled with much efficiency until his death.

YOUNG, Samuel Baldwin Marks, soldier, born in Pittsburg, Pa., Jan. 9, 1840. He entered the Federal army as a private at the beginning of the Civil War, in 1861, and was mustered out of the service in 1865 with the rank of brigadier general. The following year he entered the regular army as second lieutenant, but was soon promoted to be a captain. In 1898 he was made a brigadier general for service in the Spanish-American War and served under General Shafter in the campaign against Santiago. He was sent to the Philippines in 1901, where he was made military governor of the northwestern part of Luzón. After his return to the United States he commanded the department of California and was made chief of staff of the army in 1903. The following year he retired by operation of law.

YOUNG GERMANY, the name applied to a school of German writers, of whom Laube and Heine were the foremost representatives. These writers came into prominence about the middle of the 19th century. Their prevailing spirit was to displace romanticism, emancipate the Jews, and separate the church from the state. As writers they maintained the principles of democracy and rationalism.

YOUNG ITALY, a society established in Italy in 1831, under the direction of Mazzini. It had for its purpose the union of the Italian people under an independent government, which it sought to attain by a revolutionary movement. Savoy was invaded by a military force under Mazzini in 1834, but this movement resulted in a failure. However, the feeling for unification of Italy was strengthened and the monarch of Sardinia became the leader in the purpose, and the end sought was finally accomplished by Victor Emmanuel in 1871.

YOUNG MEN'S CHRISTIAN ASSOCIATION, a religious society founded in London, England, by George Williams, in 1844, but which now has branch organizations in all the continents. In 1908 it had organizations in 3 countries of Australasia, 5 of Africa, 9 of Asia, 10 of North and South America, and 24 of Europe. The purpose is to improve the spiritual condition of young men, but active membership is limited to members of evangelical churches. Others are taken in as associate members and are entitled to all the privileges and benefits, except holding office and voting on questions affecting the constitution. The first association in America was founded in 1851, but there are now 2,040 associations in the United States and about 260 in Canada. Prosperous organizations are maintained in Mexico, South America, and the West Indies, the total membership in America being 826,348 persons. The American associations have property valued at $99,642,863.

The associations generally, besides conducting religious services, provide for the benefit of the members libraries and reading rooms, bath rooms, gymnasia, lectures, and special instruction in various branches. In most cases they aim to obtain employment for the members. There are 900,000 volumes in the libraries of these associations in the United States. About $35,000,000 was subscribed in the United States in 1917 to expend near the firing lines in Europe.

YOUNGSTOWN (yŭngz'toun), a city in Ohio, county seat of Mahoning County, 67 miles southeast of Cleveland, on the Erie, the Pennsylvania, the Baltimore and Ohio, the Lake Shore and Michigan Southern, and other railroads. It is surrounded by a fertile farming and dairying region, which contains extensive deposits of bituminous coal. Among the chief buildings are an excellent county courthouse, the Federal building, the public library, the Park Theater, the Elks' and Odd Fellows' halls, the Y. M. C. A. building, the Children's Home, and many schools and churches. The streets are paved substantially and have gas and electric lights, sewer drainage, and waterworks. They are traversed by an extensive electric street railway system. Among the manufactures are hardware, vehicles, soap, brooms, machinery, engines, boilers, furniture, railway cars, bridges, and farming implements. The city has a large trade in merchandise, cereals, and fruits. The place was settled by John Young in 1797. It was made the county seat in 1874. Population, 1900, 44,885; in 1920, 132,358.

YOUNG WOMEN'S CHRISTIAN ASSOCIATION, an organization having the fourfold purpose of ministering to the social, physical, mental, and spiritual wants of young women. The work of this society is promoted in much the same way as that of the Young Men's Christian Association and in the influence for good it keeps pace with that institution. It was founded as an international association in 1886, but national organizations date from a period several decades earlier. The local organizations are well represented in the cities of Canada and the United States. At present there are 948 associations in the latter country, with a membership of 330,045. State organizations are maintained in nearly all the states. *The Evangel,* a monthly publication issued in Chicago, is an official organ. About 1,340 branches are maintained in Great Britain, 500 in Germany, 425 in Denmark, and 300 in France. During the Great European War it rendered extensive service to the country.

YPSILANTI (ĭp-sĭ-lăn'tĭ), a city of Michigan, in Washtenaw County, on the Huron River, thirty miles west of Detroit. It has communi-

cation by the Michigan Central and the Lake Shore and Michigan Southern railroads. The surrounding country is a fertile farming and fruit-growing region. The features include the city hall, the high school, the public library, and the Michigan State Normal College. It has electric railway facilities, electric and gas lighting, waterworks, and sanitary sewerage. Among the chief manufactures are furniture, silk goods, woolen and cotton textiles, paper, flour, vehicles, and machinery. The place was settled in 1825 and incorporated in 1858. Population, 1904, 7,587 ; in 1920, 7,413.

YTTRIUM (ĭt′trĭ-ŭm), a rare metal discovered by Gadolin in 1794, so named from Ytterby, Sweden, where the minerals containing it were first found. It occurs in small quantity as a component of several scarce minerals, such as allanite, gadolinite, and tankelite. Yttrium is a grayish powder, has no odor or taste, and is soluble in the carbonates of the alkalies. When burnished, it assumes the luster and color of metallic iron. More or less crystalline salts are formed by uniting yttrium with sulphur, iodine, or phosphorus.

YUCATAN (yo͞o-kȧ-tän′), a peninsula of North America, lying south of the Gulf of Mexico and extending between the Gulf of Campeachy and the Caribbean Sea. It is separated from Cuba by Yucatan Channel and constitutes two states of Mexico, Campeche and Yucatan, with an area of 55,425 square miles. The three bays of Ascencion, Espiritu Santo, and Chetumal indent the eastern shore, where a number of well-protected harbors are formed. A number of productive islands lie off its coast, especially toward the east and north. The surface is generally level, but through the central part extends a chain of hills. A large portion of the interior has fine forests of valuable timber, such as rosewood and mahogany. The Usumacinta is the only river of importance, which forms a part of the western boundary of the state of Campeche. Among the productions are tobacco, coffee, maize, vanilla, cotton, rice, indigo, sugar cane, fruits, and vegetables. Horses, cattle, sheep, and swine are reared in abundance.

Yucatan is inhabited chiefly by Indians of the Maya race, and only about one-fifth of the people are of Spanish descent. Many ruins of magnificent pyramids, palaces, and cities are common to Yucatan, indicating that in former times a people of skill and advanced civilization occupied the region. They occur not only on the peninsula proper, but in the northern parts of Guatemala and Belize and on some of the islands. Within recent years several railroad lines have been built, and there is a steady growth in population and industrial wealth. Mérida is the chief railroad and manufacturing city and Campeche, on the Gulf of Campeachy, is the principal seaport. The peninsula has a population of 548,660.

YUCCA (yŭk′kȧ), a genus of plants of the lily family, having woody stems, lanceolate leaves, and a large panicle of showy, whitish, bell-shaped, drooping flowers. A number of species have been catalogued, all of which are native to the southern part of the United States, Mexico, and Central America. Most of the well-known species are cultivated as ornamental plants, especially the kind known as the *common Adam's*



THREE SPECIES OF YUCCA.

needle, which attains a height of eight to twelve feet in the native state, but is much smaller when cultivated in gardens. The stem and foliage are employed in Mexico for preparing a fiber useful in making cordage and the fruit, which is quite similar to small bananas, is consumed as an article of diet.

YUKON (yo͞o′kŏn), a river of North America, the most important waterway of Alaska. It rises in Yukon Territory, near Fort Selkirk (now Pelly), by two branches, the Pelly and the Lewes, flows toward the northwest to Fort Yukon, where it receives the Porcupine River, and assumes a general course toward the southwest, flowing into Bering Sea. The Yukon has a total length of 2,125 miles, is 20 miles wide in its lower course, and enters the sea by an extensive delta. Great deposits of silt have been made near its mouth, thus preventing the largest vessels from entering from the sea, but it is navigable for almost its entire course. The extreme

cold of winter prevents navigation the greater part of the year. Vast numbers of salmon swarm the river in the summer months and ascend fully 1,500 miles from the sea. The chief tributaries of the Yukon include the Koyukuk, Porcupine, Tanana, and Stewart rivers. It receives the discharge from Lake Teslin through the Hootalingua and the Lewes rivers. The Klondike is a noted tributary, joining the Yukon at Dawson, and is famous for its gold fields.

YUKON, a Territory of Canada. situated in the northwestern part of the Dominion. It is bounded on the north by the Arctic Ocean, east by Mackenzie, south by British Columbia, and west by Alaska. The southern boundary is formed by the 141st meridian of west longitude, which separates from Yukon a strip of land belonging to Alaska. Its extent from north to south is about 650 miles, from the Arctic Ocean on the north almost to the Pacific on the south. The area is 196,327 square miles.

Description. The surface is elevated and mountainous, and the altitude of the interior ranges from 2,000 to 3,000 feet. A coast range extends along the shore of the Arctic, and another range of highlands passes from southeast toward the northwest through the southwestern part of the Territory. The latter includes some of the highest summits in North America, such as Mount Logan, 19,539 feet, and Mount Saint Elias, 18,010 feet. Many of the loftiest summits rise considerably above the snow line, both in the north and in the southwest, and here is the source of many glaciers. Valuable forests of vast extent skirt the slopes and streams.

The drainage is chiefly by the Yukon and its tributaries. This great river has its source in the southwestern part and crosses the west central border into Alaska. It is formed by two headstreams, the Pelly and the Lewes rivers, at Pelly, whence it is navigable for boats to its mouth. Among the tributaries of the Yukon in the Territory are the Chandindu, the White, and the McQuesten rivers. The Porcupine River drains the northern part and joins the Yukon after passing into Alaska. A large region in the southwestern part is drained by the Kaskawulsh River through southern Alaska into the Pacific, and the southeastern part has a number of headstreams that flow through the Liard River into the Mackenzie.

The climate is marked by great extremes of temperature, ranging from 68° below zero in winter to about 85° above zero in summer. The long and cold winters are followed by short but pleasant summers. In the north are masses of ice covered by thick moss and here the ground never melts. However, the cold is somewhat mitigated by the dryness of the air. Ice closes the navigation of the Yukon River from the middle of September until the middle of May. Constant darkness prevails during the winter in the northern part, and daylight continues without intermission from the middle of May until the early part of August. The rainfall is not heavy.

Resources. The natural resources of Yukon are very extensive. While lumbering has not been developed extensively, the large forests of fir, cedar, pine, spruce, and poplar possess great commercial value. Fish and game are abundant and furnish the chief sustenance to the white hunters and to the Indians. Among the wild animals are the elk, bison, deer, musk ox, caribou, mountain sheep, ducks, geese, partridge, and prairie chicken.

The southern part has a large expanse of territory that is susceptible to cultivation. Here may be grown profitably the hardier crops, such as rye, barley, potatoes, cabbage, turnips, and peas. Many native grasses abound and grazing and dairying have been developed to some extent. The domesticated animals include cattle, horses, dogs, and reindeer.

Yukon is especially rich in mineral resources. Gold is the principal product and the annual output averages about $7,500,000. In the eleven years from 1896 to 1906 the total output of gold was $112,864,363. Bituminous coal of a good quality is obtained, but the output is consumed locally. Copper mines are worked in the southern part. Other minerals include silver, platinum, asbestos, granite, limestone, and petroleum, but these are not worked to any extent.

Transportation. The Yukon River is the principal highway of commerce, but it is closed by ice from the middle of September until the middle of May. A railway extends into the southern part of the Territory from Skagway, in Alaska, with its terminus at White Horse. This line is 111 miles long and furnishes transportation between Lynn Canal, which is reached by vessels from the Pacific, to the Tahkeena River, a headstream of the Yukon. Canadian vessels are permitted to pass free throughout the entire length of the Yukon River. Telegraphic communication is maintained between Yukon and the leading cities of the Dominion.

Government. The Territory is administered by a commissioner, who is assisted by an executive council of ten members, five of whom are elected by the people. It is represented by one member in the Dominion House of Commons. Many missionary schools are maintained by religious denominations, and public instruction is provided in elementary and secondary schools under government support. The northwest mounted police, a force of constabulary, is instrumental in maintaining peace and enforcing the authority of the government of the Dominion.

Inhabitants. The people who reside within the Territory consist largely of Eskimos and prospectors, but substantial business interests have been developed in the towns and the mining districts. Dawson, the center of the gold fields, is the capital and largest town. Other towns include White Horse, Pelly, Bonanza, and

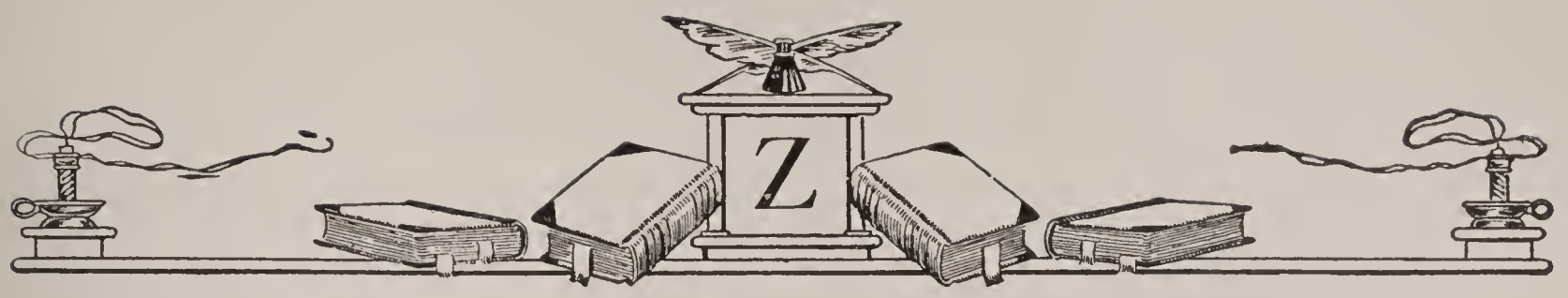
Dominion. In 1901 the Territory had a population of 27,219; in 1921, 8,512.

History. The interior of Yukon was unknown until 1840. In that year Robert Campbell, a representative of the Hudson's Bay Company, explored the region to find a stream flowing westward to the Pacific. He followed the Pelly to its confluence with the Lewes, in 1843, and thus discovered the real source of the Yukon River. Fort Selkirk was soon afterward built at the junction of the two streams, but the town was afterward named Pelly. A large rush of prospectors and gold miners came into the region in 1908, when it was organized as a Territory of the Dominion. A public school system was inaugurated in 1901 and the following year representation was granted in the Parliament of the Dominion. Since that time there has been a constant growth in the development of its resources.

YUMA (yōō′mȧ), a city of Arizona, county seat of Yuma County, 250 miles southeast of Los Angeles, Cal. It is situated at the junction of the Gila and Colorado rivers and on the Southern Pacific Railroad. The surrounding country is agricultural, fruit growing, and mining. The features include the county courthouse, the high school, and several schools and churches. It has a large trade and good municipal improvements, such as electric lights, telephones, and waterworks. Population, 1920, 4,237.

YUMAS (yōō′măz), an Indian tribe of North America, which includes the Mohaves of Arizona. These Indians formerly occupied western Arizona and eastern California, but they are now confined principally to the region near the junction of the Gila and Colorado rivers. Fort Yuma, Cal., opposite from Yuma, Ariz., has long been a chief center of government supervision. The Yumas are a small tribe.

YVERDUN (ē-vâr-dôn′), or **Yverdon,** a city of Switzerland, in the canton of Vaud, at the southwestern end of Lake Neuchâtel. It is noted for its fine site among the scenic places of Switzerland. The palace, built by Duke Conrad of Zähringen in 1135, was the seat of the institute conducted by Pestalozzi from 1805 until 1825. Among the improvements are electric lighting, a museum of Roman antiquities, several fine promenades, and a gymnasium. It was fortified by the Romans, when it was noted for its trade and manufactures. Nearly all the inhabitants are French Protestants. Population, 1917, 8,045.



Z, the twenty-sixth and last letter of the English alphabet. It is a sibilant or hissing consonant and has the sound of the hard terminal *s*, as in *dies, stands, multiplies*. In the Phoenician, Greek, and Latin it was the seventh letter, but was dropped from the Latin in the 3d century B. C. It was restored in the 1st century B. C. to write Greek words, when it was placed at the end of the alphabet. The words in modern English which begin with *z* are all derived from other languages, principally from the Greek. It is the rarest English tone, representing less than three per cent. of the recognized sounds, and first came into use in 1688.

ZAANDAM (zän-däm′), or **Saardam,** a city of the Netherlands, in the Province of North Holland, six miles northwest of Amsterdam. It is at the junction of the Y and the Zann, the latter of which has been well canalized. Many of the buildings are of brick and are surrounded by well arranged gardens in which roses and tulips are plentiful. It is noted for its cleanliness and for being a typical place of the Netherlands. Among the industries are machine shops, lumber yards, iron works, and flouring mills. Peter the Great, in 1697, occupied a cabin in this place while he worked as a shipbuilder. Population, 1916, 24,166.

ZABRZE (zäbr′zhę), a city of Germany, in Silesia, 95 miles southeast of Breslau. It has extensive railroad and electric railway facilities. The noteworthy buildings include the city hall, the central railroad station, the high school, and a number of churches. It is in the center of one of the richest coal mining districts of Silesia, the works being operated by the state. Other industries include wire mills, coke ovens, machine shops, and brick and tile yards. The place owes its recent growth almost entirely to the mining and manufacturing interests. Population, 1915, 55,634.

ZACATECAS (sä-kȧ-tȧ′kȧs), a city of Mexico, capital of the state of Zacatecas, 300 miles northwest of the city of Mexico. It has connections with other trade centers by railways and is surrounded by one of the most productive mining regions in the world. The silver veins in the vicinity were discovered by Juan de Tolosa, in 1546, and a thriving silver-mining camp soon sprang up on its site. With the construction of railways and the development of its mineral resources the city grew into importance. It now has a number of public schools and churches, several hospitals and convents, and a considerable trade in farm produce and merchandise. Among the manufactures are ironware, utensils, tobacco products, clothing, and machinery. The place was incorporated as a city in 1585. Population, 1920, 25,905.

ZALINSKI (zȧ-lĭns′kē), **Edmond Louis Gray,** soldier, born in Kurnick, Germany, Dec. 13, 1849. He came to the United States in 1853, graduated from the schools of Syracuse, N. Y., in 1863, and soon after entered the Union Army. In 1864 he was placed on the staff of General Miles and for bravery at the Battle of Hatcher's Run, Virginia, was commissioned second lieutenant. He remained on General Miles's staff until the close of the war. In 1866 he was made second lieutenant in the regular army and was promoted captain in 1887. He was professor of military science at the Massachusetts Institute of Technology from 1872 to 1876. Besides being efficient as a soldier and teacher, he is known for his invention of an electrical fuse which has proven of great value in the pneumatic dynamite gun. He also invented a telescopic sight on artillery, an intrenching tool, and a ramrod bayonet.

ZAMBEZI (zȧm-bā′zē), a large river of South Africa, which ranks as the fourth in size of that continent. It rises near the southern boundary of the Congo Free State and, after a tortuous course of 1,650 miles toward the southeast, flows into the Mozambique Channel by an extensive delta. The upper course is generally toward the south, while the middle portion flows toward the northeast, and the lower course is toward the southeast. A short distance above Sesheke, at the eastern extremity of German Southwest Africa, is the Katema Molilo Rapids, and some distance below it is the celebrated Victoria Falls. This falls is 400 feet high and about 2,500 feet above sea level. The Zambezi basin includes 750,000 square miles, much of which is highly fertile and contains valuable forests. The Zambezi delta has an area of 25,000 square miles. Among its chief confluents is the Shire river,

which rises in Lake Nyassa and joins the Zambezi 90 miles above the sea. The Zambezi system furnishes about 4,000 miles of navigation, but as a whole it is comparatively unimportant for commercial purposes, since the stream and many of the tributaries are obstructed by falls and rapids. See **Victoria Falls.**

ZANESVILLE (zānz′vĭl), a city in Ohio, county seat of Muskingum County, 52 miles east of Columbus, on the Ohio River and Western, the Baltimore and Ohio, the Cincinnati and Muskingum, and other railways. It is beautifully situated at the confluence of the Licking and the Muskingum rivers, is surrounded by a fertile farming region, and is connected with other trade centers by a number of electric railroads. The rivers are crossed by several fine bridges. Among the chief buildings are the county courthouse, the city hall, the high school, the Masonic Temple, the Clarendon Hotel, the Memorial Hall, the public library, and many churches. It has a large trade in farm produce. merchandise, and bituminous coal, which is mined in large quantities in the vicinity. The manufactured products include cotton and woolen goods, flour, paper, soap, chemicals, cigars, wire, hardware, steam engines, and machinery. It has large foundries and railroad machine shops. The streets are well improved by grading and paving. One of the first settlements in the Northwest Territory was made at Zanesville, in 1799, by Jonathan Zane, and it was the seat of the State Legislature from 1810 to 1812. Population, 1900, 23,538; in 1920, 29,569.

ZANGWILL (zăng′wĭl), **Israel,** novelist, born in London, England, in 1864. He descended from Jewish parents and attended the Jew's Free School in London. Several lecturing tours were made by him in Canada, the United States, Holland, and Palestine, and he met with success in writing novels and dramas in which Jewish scenes and characters are depicted. He has been influential as an advocate of Zionism and the settlement of Palestine by Jews. His celebrated play, "The Melting Pot," which proposes amalgamation as the solution of the Jewish problem in America, was presented with great success in the large cities. Among his general works are "The Big Bow Mystery," "They that Walk in Darkness," "Children of the Ghetto," "The Moment of Death," "Merely Mary Ann," "The Serio-Comic Governess," and "The Mantle of Elijah."

ZANTE (zän′tē), one of the largest islands of the Ionian group, situated nine miles west of the Peloponnesus. It has an area of 277 square miles. The island is of volcanic origin, but has fertile soil. The climate is pleasant and healthful. Oranges, olives, melons, citrons, and currants are the chief products. It has manufactures of wine, carpets, cotton and linen goods, gold ornaments, and clothing. The wine and currants of Zante are widely known. Anciently the island was known as Bacynthus and was long an independent state. In 1864 it was annexed to Greece along with the Ionian isles. Zante is the capital and largest city. Population, 1918, 46,380.

ZANZIBAR (zän-zĭ-bär′), a British protectorate in Africa, lying east of German East Africa. It includes the islands of Zanzibar and Pemba, off the eastern shore. The island of Zanzibar has an area of 625 square miles. It contains the city of Zanzibar, which is the chief town and seat of local government and has an estimated population of 100,000, thus being the largest city on the eastern coast of Africa. Pemba has an area of 360 square miles. Both these islands have fertile soil and good harbors. They produce cloves, hides, ivory, copra, shells, cotton, indigo, rice, fruits, and vegetables. Domestic animals, such as horses and cattle, are reared successfully. A small strip of the mainland was formerly claimed by Great Britain, but it is now included in German East Africa. Great Britain, Germany, and France have the larger part of the export and import trade. A railway is in operation from the city of Zanzibar to the plantations in the northern part of the island, a distance of seven miles. Natives known as Swahillis form the laboring class. They are peaceable, loyal to the government, and apt in learning civilized arts. Other inhabitants include Arabs, Germans, English, Portuguese, French, Hindus, and Italians. Most of the people are Mohammedans, but many Christian missions are maintained. Slavery in a modified form still exists, though the laboring classes have their own houses and cannot be separated from their wives and families. The entire population is estimated at 250,000.

ZEALAND or **Zeeland** (zē′lạnd), the largest island of Denmark. It is separated from Sweden by The Sound and from the island of Fyen by the Great Belt. The shores are indented by numerous inlets, thus reducing the land area to 2,638 square miles. Farming and dairying are the chief industries, but it has considerable interests in stock raising, fishing, and manufacturing. The chief manufactures include woolen and linen goods, leather, dairy products, salt, clothing, machinery, and sailing vessels. Copenhagen is the capital of Zealand and of Denmark. Other important cities include Roeskilde, Elsinore, and Slagelse. Population, 1908, including the islets of Amager and Möen, 1,103,602.

ZEBRA (zē′brȧ), an animal resembling the horse, but which has external characteristics found in the ass. It resembles the latter in having no warts on the legs, in the tail being covered with long hairs only toward the extremity, and in the full and arched neck having an erect and stiff mane. Several species have been enumerated, all of which are more or less striped. The height is about four and a half feet at the shoulder and the form is light and graceful. The general color is a yellowish-white, with

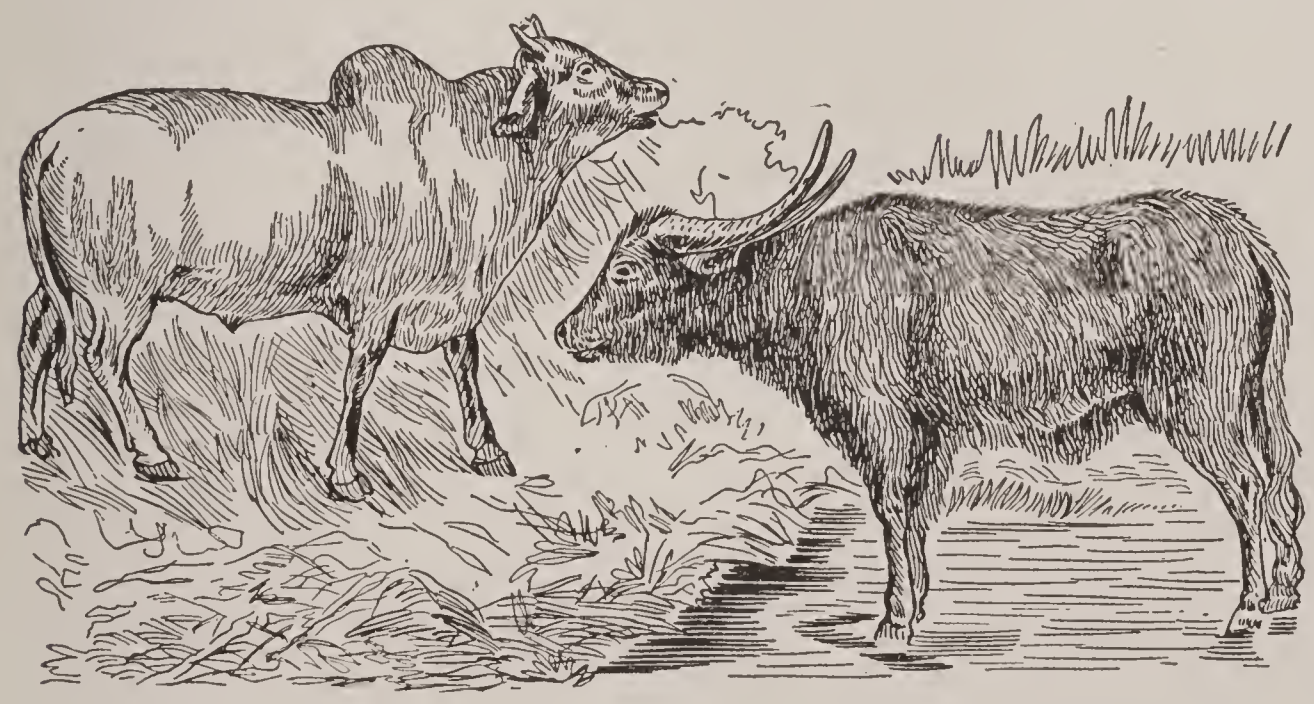
black stripes on the neck, limbs, and body. Zebras have ears rather longer than those of the horse and the senses of hearing, smell, and sight are well developed. They are shy animals and on the least alarm gallop to a place of safety. When attacked by an enemy, they defend themselves by forming a compact body and beating with their heels. In this way they are able to protect themselves successfully against the leopard and lion. Zebras were formerly found throughout the region of Africa lying south of the Equator, but their number is diminishing quite rapidly. The *true zebra,* or *mountain zebra,* of the mountainous parts of Cape Colony is nearly exterminated. It is more barred than *Burchell's zebra,* found in herds on the plains of South Africa. Other species inhabit the country south of Abyssinia and Somaliland. The natives prize the flesh of the zebra and use these animals as beasts of burden in the domesticated state.



MOUNTAIN ZEBRA.

ZEBÛ (thā-vo͞o′). See **Cebü; Philippines.**

ZEBU (zē′bū), a class of animals of the ox family, which are reared extensively in the region from Japan to East Africa, but they atttain the greatest perfection in India. Many species have been originated by breeding, varying much in size, strength, and color. They differ from the cattle reared in Canada and the United States mainly because of their drooping ears and convex forehead, and in having a fatty hump on the withers, which in the larger breeds weighs 40 to 50 pounds. Zebus are docile and gentle animals. In general they are reared for their milk and flesh, but are used quite extensively as beasts of burden and draught. They are able to travel 25 to 30 miles per day with a reasonable burden. The larger breeds, when yoked to the wagon or plow, serve every purpose of the strongest ox. The zebu is as important in India, Persia, Arabia, and other Asiatic countries, in the industries and household economy, as cattle are in America and European countries.



ZEBU. BUFFALO.

ZEBULUN (zĕb′ū-lŭn), one of the twelve tribes of Israel, whose country lay in the fertile valleys and hills north of the plain of Jezreel, extending from the Lake of Gennesaret to the Mediterranean. We learn from Genesis xxx., 20, that the Zebulunites descended from the sixth son of Jacob and Leah. They were noted for their skill in commercial enterprises and warlike spirit. In their prosperous times they had a profitable trade from their ports on the Mediterranean with the Phoenicians.

ZECHARIAH (zĕch-ȧ-rī′ȧ), or **Zachariah,** an eminent prophet of the ancient Hebrews, son of Berechiah, the son of Iddo. He was born in Bablyon at the time of the captivity and accompanied the exiles led by Jeshua and Zerubbabel to Palestine, where he developed much influence among his countrymen and was elevated to the offices of priest and prophet. His name is attached to the eleventh in order of the twelve minor prophetic books, and his prophecies are devoted largely to the glory that shall come to Jerusalem after the rebuilding of the temple. The book assigned to him is the largest of those written by the minor prophets. He predicted that both Phoenicia and Damascus would be brought to ruin, but pictured a brighter future for Judah than would fall to the share of Javan (Greece). According to his prophecies the Hebrew people were to pass through a time that would test their courage and perseverance, but, when the good times returned, a period of great prosperity would follow, and "every pot in Jerusalem and in Judah shall be holiness unto the Lord of hosts."

ZEDEKIAH (zĕd-ē-kī′ȧ), the son of Josiah by his wife, Hamutal, and the last king of Judah. He succeeded his nephew, Jehoiachin. The Chaldeaens captured him at the siege of Jerusalem, in 588 B. C., and conveyed him to Babylon, after slaying his sons and depriving him of his eyesight. He died in captivity and with him the kingdom of David and Solomon ended.

ZEISBERGER (zīs′bĕrg-ẽr), **David,** missionary, born in Zauchtenthal, Austria, April 11, 1721; died in Goshen, Ohio, Nov. 17, 1808. He descended from German-Moravian parents and in 1740 came to America, settling in Georgia. Later he proceeded to Bethlehem, Pa., where he took part in establishing the Moravian colony and studied the Indian languages. In 1743 he took up missionary work among the Delawares and Onondagas, converting many of them to Christianity. His labors were interrupted at the outbreak of the French and Indian War, but he continued active as a religious worker, and in 1771 established a mission on the Muskingum River, Ohio. This settlement was broken up by the Wyandots and he labored for some time in the missionary field of Canada, but returned to Ohio in 1798 and founded Goshen. Zeisberger was not only master of several Indian languages, but wrote many valuable works, including Indian-English grammars, spelling books, and dictionaries. Among the more important of his writings are "German and Onondaga Lexicon," "Sermons for Children," "Delaware and English Spelling Book," "Dictionary in German and Delaware," and "Collection of Hymns for Christian Indians."

ZELAYA (sĕ-lä′yä), **José Santos,** soldier and statesman, born in Managua, Nicaragua, in 1845; died May 17, 1919. He studied in his native town, joined the army. In 1885 he was made general for valued services, and became the recognized head of the liberal party. He was a leader in the revolution of 1893, when a new constitution was adopted and he was made president of the republic of Nicaragua. His administration was liberal. He extended the influence of the government, promoted education, and fostered commercial expansion. In the agitation for a union of the republics of Central America, Zelaya was a recognized leader.

ZELLER (tsĕl′lẽr), **Eduard,** theologian and philosopher, born in Kleinbottwar, Germany, Jan. 22, 1814; died March 19, 1908. He studied at Tübingen and Berlin and became a teacher of theology at the former institution in 1840. In 1847 he accepted the chair of theology at the University of Berne and later taught at Marburg, Heidelberg, and Berlin. He was one of the founders of the *Theologische Jahrbücher,* in which he published much in support of the philosophical and historical methods of Bauer, Strauss, and Hegel. His chief writings include "Philosophy of the Greeks," "The Theological System of Zwingli," "The State and the Church," "Frederick the Great as a Philosopher," and "The History of Philosophy since Leibniz."

ZEMSTVO (zĕmst′vŏ), the chief political body in the government of a province in Russia. The members are chosen by the suffrage of the three classes known as landed proprietors, peasants, and householders of the town. It is presided over by the president, or governor, of the province and has general administrative power within its jurisdiction. This body elects an *upraba,* whose duty is to see that the regulations of the zemstvo are enforced.

ZENANA (zĕ-nä′nȧ), the name of a dwelling used by a high caste family of India, in which the women and girls have their quarters. A typical dwelling of this kind is in two parts, each built around its own court, and the one nearest the street is occupied by the men. The zenana is in the rear building, usually on the second floor, while the first floor is occupied by the kitchen and in part is used for storage. The poorer buildings of this class are so constructed that milch cows and other domestic animals occupy a part of the first floor.

ZEND-AVESTA (zēnd′ȧ-vĕs′tȧ). See **Avesta.**

ZENGER, John Peter, publisher, born in Germany, in 1680; died in 1746. He emigrated to America in 1700 and took up his residence in New York City, where he established himself in the printing and publishing business. In 1733 he founded the New York *Weekly Journal,* which he made an important factor in the government. His attacks upon some of the practices engaged in by public men caused him to be arrested on a charge of libel. Andrew Hamilton, an eminent barrister from Philadelphia, was employed to defend him before the jury, and a verdict of not guilty was the result. The questions decided in this trial established a precedent in furthering the freedom of the press in America.

ZENITH (zē′nĭth), the point in the heavens which is precisely over the head of the observer. The point directly opposite under the feet of the observer is called the *nadir.* These terms are employed in astronomy. A plumb line suspended from the zenith would pierce space so as to rest upon or directly above the nadir.

ZENO (zē′nō), famous Greek philosopher, founder of the Stoics, born at Citium in Cyprus about 350; died about 258 B. C. He was the son of a merchant and, after losing his fortune in a shipwreck, adopted the Cynic doctrines, a form of belief that holds riches in contempt. To fit himself for teaching, he studied twenty years under various masters and then established a school and developed a system of philosophy. His followers became known as Stoics from the Painted Porch, which he selected as the place for meeting his pupils. Zeno was a contemporary of Epicurus, the founder of the Epicureans, and Pericles was among his noted pupils. The doctrines taught by him inculcated simplicity and energy, led the student to a life of patience and fortitude, and developed nobility of character. Many ancients embraced the doctrines taught by Zeno, and both Greeks and Romans honored him in paintings and sculptures. Only a few fragments of his writings are extant.

ZENO, Emperor of the Eastern Empire from 474 to 491, the husband of Ariadne, daughter of Leo I. He became patrician in 468 and was soon after made commander of the imperial

guard of the armies of the East. His reign was largely disturbed by wars, not only by the invading Goths, but the people of Constantinople opposed him because he was of foreign birth. His government was cruel and oppressive and he gave himself up to pleasure, leaving the administration of public affairs to Illus, his sole consul and minister. He was succeeded by Anastasius.

ZENOBIA (zĕ-nō′bĭ-ȧ), **Septimia,** Queen of Palmyra and wife of King Odenathus. She was the daughter of an Arab chief and became noted for her learning in Greek, Latin, Syriac, Egyptian, and other languages. After the death of her first husband she married Odenathus, prince of Palmyra, who was highly successful in the Persian wars. She was as courageous as learned and accompanied her husband as an adviser and assistant to the East. After the death of her husband, in 266 A. D., she succeeded to the throne, assuming the title of Queen of the East. It was her ambition to annex Asia Minor, Syria, and Egypt, but the Romans under Emperor Aurelian defeated her in two battles in 270 and besieged her at Palmyra. After a brave defense, she attempted to escape from the city, but was taken captive and carried to Rome, where she was made to grace the triumph of Aurelian. The latter presented her with large possessions near Tivoli, where she lived in comfort and luxury until her death. Zenobia ranks with Cleopatra in her talents and personal traits, but possessed purity of character and a greater degree of prudence. Her son, Vahballathus, by her first husband was given a principality in Armenia.

ZEPHANIAH (zĕf-ȧ-nī′ȧ), the ninth in order of the twelve minor Hebrew prophets, who prophesied in the reign of King Josiah, from 630 to 624 B. C. According to the account he descended in the fourth generation from a man by the name of Hezekiah, which is supposed to have reference to the King of Judah. His prophecy is divided into three chapters. The first is a warning against Judah and the Philistines, in the second he foretells the fall of Nineveh, and in the last he predicts salvation and a blissful future for those who are purified in the fear of God. Although the first two chapters are written in a somber tone, he gives evidence in the last of mastery of style and ability to use language forcibly.

ZEPPELIN, Ferdinand, soldier and aëronaut, born in Constance, Germany, July 8, 1838. He studied at the Polytechnic School in Stuttgart and in a military school at Ludwigsburg. In 1858 he became an officer in the army. He took part in the Seven Weeks' War and the Franco-German War, in both of which he rendered valuable service. Subsequently he began to study airships with a view of producing devices which would be of value in military engagements. He established a works at Friedrichshafen, on Lake Constance, where he produced a large number of dirigible balloons. It may be said that he developed this type of aëronautic machines and was the first to employ engines of considerable power to propel them. In 1908 he made a memorable flight of about 800 miles, with a maximum speed of 40 miles per hour, but his airship was wrecked by a storm after the successful experiment. A popular subscription was immediately taken to rebuild this airship. Up to 1910 he was the most successful aëronaut in constructing and sailing with the dirigible balloon. The Reichstag appropriated $537,500 to purchase two of his airships and presented him with a fund of $100,000 in recognition of his service to science. He died March 8, 1917.



COUNT VON ZEPPELIN.

ZERO (zē′rō), in physics, the term applied to the point in time or space which constitutes the base or origin of measurement. Originally the zero point in thermometers was fixed at the normal temperature of the human body, and later the fundamental point was based upon the temperature of spring water. Fahrenheit fixed the zero in his thermometer by the temperature obtained from mixing salt and ice, while the freezing point of ice was made the zero by Réaumur. In the Centigrade thermometer the freezing point is zero and the boiling point is 100°. In mathematics, the zero is a symbol written *O,* signifying the absence of number or quantity. It is used in the same way as a symbol to signify an infinitesimal quantity. In algebra the positive numbers proceed to infinity in one direction from O, and the negative numbers proceed from it to infinity in the opposite direction.

ZEUS (zūs), the chief deity of the Greeks, who was regarded by them as the ruler of heaven and earth. He was represented as the son of Cronus and Rhea, the brother of Poseidon and Hera, and sometimes as the husband of the last mentioned. The ancient Greek writings mention him as god of all aërial phenomena, as the personification of the laws of nature, as lord of the state, and as the father of gods and men. After expelling his father and the Titans from the throne, he assumed absolute control, but appointed Poseidon as god of the sea and gave Hades control of the infernal regions. With these two personages he had joint control of the earth. The

top of Mount Olympus, a lofty mountain between Thessaly and Macedon, was believed to be the home of Zeus, where he was supposed to be hidden from mortal view by the clouds and mist. He was worshiped at various places, but chiefly at Dodona, Crete, and Arcadia, and the oak tree and the summits of mountains were sacred to him. In statuary he was represented as accompanied by an eagle, perhaps from the circumstance that this bird is capable of gazing at the sun, thus suggesting the idea that it was able to contemplate the splendor of divine majesty. Zeus was afterward identified with the Ammon of Libya and the Jupiter of the Romans. His seven immortal wives were Hera, Leto, Metis, Themis, Demeter, Eurynome, and Mnemosyne. See **Jupiter.**



ZEUS.

ZEUXIS (zūks'ĭs), a painter of ancient Greece, who flourished near the end of the 5th century B. C. It is thought that he was born in Heraclea, on the Euxine, about 450 B. C., but nothing is certain as to the dates of his birth or death. The greater part of his life appears to have been spent at Ephesus, and he seems to have visited Athens and the southern part of Italy. Mention is made of him by Cicero, Lucian, and Pliny. His chief paintings include "Helen," "Alcmena," "Zeus Surrounded by the Gods," and "Hercules Strangling the Serpent."

ZHITOMIR (zhĭ-tȧ-mēr'). See **Jitomir.**

ZIETHEN (tsē'tẹn), **Hans Joachim von,** famous military leader, born in Brandenburg, Germany, May 18, 1699; died in Berlin, Jan. 26, 1786. He obtained a careful military education and in 1726 became lieutenant of dragoons in the army of Prussia. In 1735 he served with eminent success in the campaign against France, as colonel of a regiment of hussars, and in the Silesian War distinguished himself at Hohenfriedberg, Hennersdorf, and Jägerndorf. His services were of value throughout the Seven Years' War. Frederick the Great decorated him with a number of medals and bestowed upon him large landed interests. On the Ziethenplatz, in Berlin, is a fine monument erected to his honor.

ZILLEH (zȧ'lĕ), or **Zileh,** an ancient town of Asiatic Turkey, formerly called Zela, 28 miles southwest of Tokat. It occupies an eminence overlooking the surrounding country and in former times was the seat of beautiful temples and vast fortifications, but now only ruins remain of the ancient structures. Zilleh was the scene of a battle between Julius Caesar and the Pharnaces. It was in regard to this engagement that the former sent his famous report, "I came, I saw, I conquered." The town now has manufactures of cotton and woolen goods, utensils, earthenware, and turbans. It is ruled by the chief officer of the vilayet of Sivas. The inhabitants consist chiefly of Turks. Population, 1916, 21,450.

ZIMMERMANN (zĭm'mĕr-mạn), **Johann Georg von,** eminent physician and author, born in Brugg, Switzerland, Dec. 8, 1728; died in Hanover, Germany, Oct. 7, 1795. He studied in his native town and Berne, and afterward took a course in medicine at the University of Göttingen. In 1751 he obtained the doctor's degree, at which time he delivered an address on "Irritability." He practiced medicine in Brugg and Berne and in the meantime devoted himself to literary work. His success in the practice of medicine attracted attention throughout Europe and in 1796 he was called to Potsdam by Frederick the Great, who was then in his last illness. His writings include "On Solitude," "National Pride," "Experience in Medicine," and "Biography of Frederick the Great."

ZINC (zĭṇk), or **Spelter,** a bluish-white metal which is capable of taking a high luster. It occurs in combination with other metals and is found native in small quantities. When heated to redness in the air, it takes fire and burns with a bluish flame, giving off clouds of white zinc oxide. Sulphuric and nitric acids dissolve it. It is brittle at ordinary temperatures, but commercial zinc may be hammered into sheets or drawn into wire when heated to 212°. Dry air does not alter its lustrous surface, but in moist air it becomes dull from the formation of a film of hydrated carbonate which protects the metal from further action. Zinc was known as a component of brass long before it was discovered as an individual metal. The ores from which it is obtained are the carbonate, which is called *smithsonite,* and the sulphide called *blende.* These minerals are broken up and roasted in furnaces resembling limekilns to extract from them the zinc.

Zinc has many uses in the arts, as in the manufacture of brass for roofing and as the positive element in batteries. The property of forming a film or crust when exposed to moist air, thus keeping it from rusting, makes it valuable in the construction of water spouts, bath tubs, and tanks, and for covering iron cables and sheets to keep them from rusting. Articles covered in this way with a coat of zinc are said to be *galvanized,* though the term is not strictly proper, for the reason that electricity is not employed in the process, but the coating is put on in the way that tin is applied to iron plates when making sheet tin. Besides brass, other alloys, as bronze and German silver, contain a consider-

able quantity of zinc. It is of much value in the printers' art in that it is employed in making zinc etchings, which have taken the place of wood cuts and steel engravings in many printing offices, and is used for molds in casting artistic works, such as ornaments and statues. The production of zinc in the United States aggregates annually about 225,250 tons and represents a value of $20,000,000. Among the productive zinc fields are those of Missouri, Kansas, New Jersey, Iowa, Wisconsin, Virginia, and other states. Productive zinc mines are worked in Ontario, British Columbia, and other provinces of Canada. The chief productions in European countries are in Spain, Germany, England, and Austria. Much of the American product is exported. The value of zinc per ton ranges usually from $25 to $45.

ZINC ETCHING, a method of prepāring plates for printing from designs made by hand or otherwise, such as a drawing or lettering. The design is made in black ink on white paper or cardboard, or it may consist of a print from type. The drawing or print is photographed and the photograph is reversed on a sensitized plate, after which the negative is developed on a zinc plate. This plate is prepared by etching, which is done by covering the surface with a thin coat or ground that is not affected by acid. The design is traced with a sharp tool so as to lay the metal bare where it touches, after which diluted acid is poured over the surface. This acid bites or corrodes on the lines made through the ground. The acid is removed after the etching is sufficiently deep to render the desired contrast between the light and dark shades. When thoroughly cleaned, it is nailed to a wooden block so as to make it type-high. Etchings of this kind may be small, as the illustrations used in books, or they may constitute an entire column or even a page for printing. Fine shading cannot be reproduced by this process, as with half-tone plates and engravings, but it is convenient and inexpensive, hence is employed extensively in preparing illustrations for periodicals.

ZINC WHITE, a product used extensively for making white paint. It was formerly made by burning pure zinc and collecting the fumes, but is now obtained by a process which combines the burning of the zinc and the collecting of the vapors in the same apparatus. The method in common use consists of placing a mixture of anthracite coal and zinc upon a perforated hearth, below which is a closed ash pit. After the coal has been kindled, a blast of air is forced through the ash pit. This causes the zinc to rise in the form of fumes, but the products of combustion contain an excess of air with vapor of metallic zinc, and they undergo another combustion after leaving the charge. This final combustion causes the formation of fumes of zinc oxide, which are caught, after cooling, by being forced through bags of some textile fabric. The finished product is a white powder, which is mixed or ground with linseed oil. In this form it is used extensively as a substitute for white lead in painting woodwork, but it is less valuable for exteriors, since it is more easily injured by the weather.

ZINZENDORF (tsĭn'tsẹn-dôrf), **Nicholas Lewis, Count,** noted bishop, born in Dresden, Germany, May 26, 1700; died in Herrnhut, May 9, 1760. His father was a minister in Saxony, where he held an official position, but died when the son was quite young. The latter studied in Halle and Wittenberg, where he took courses in science, literature, and theology. He left Wittenberg in 1719 to travel in Holland and France, and subsequently published "Pilgrimage of Atticus Through the World." In 1722 he married Countess Reuss von Ebersdorf and soon after established a settlement on his estate for Protestant refugees, naming it Herrnhut. At that place John Wesley secured his religious enthusiasm and formulated plans to conduct missionary work in America. In 1739 Count Zinzendorf visited the missionary fields of the West Indies, came to New York in 1741, and soon after went to Pennsylvania, where he visited the Moravian colony and founded Bethlehem. He published many hymns and sermons.



COUNT ZINZENDORF.

ZION CITY, a city of Lake County, Ill., 30 miles north of Chicago, on Lake Michigan and on the Northwestern Railroad. It has manufactures of lace, soap, and utensils. The chief buildings include the city hall, the Christian Catholic Tabernacle, and several hospices. It was founded by John Alexander Dowie in 1900 and incorporated in 1902. **Pop.,** 1920, 5,580.

ZION (zī'ŏn), **Mount,** an eminence in Jerusalem, forming the southwest part of that city. The portion of the city built on Mount Zion was formerly called the City of David, owing to its containing the citadel of David. It was entirely within the walls of the ancient city, but at present only the north half is included, the wall running over the hill in an oblique direction. Mount Zion is 2,525 feet above sea level. Toward the southwest it descends quite abruptly into the vale of Hinnom. Many of the Old Testament writers speak of Jerusalem as the Zion, and frequently refer to it as the Daughter of Zion. It is supposed to be the Salem associated with Melchisedek, who is spoken of in Genesis xiv., 18.

ZIONISTS, the name applied to a large or-

ganization among the Jewish people of the world, whose ultimate object is to centralize influences with the view of founding a Jewish nation. While some have proposed the colonization of new countries, as portions of South America, the general inclination is to favor emigration to Palestine, where they hope to redeem the city of David and once more rear a vast temple for the worship of Jehovah. Those who are not so hopeful as to believe it possible to develop a powerful Jewish state by emigrating to Jerusalem still favor the plan for the reason that it would be the means of isolating themselves, thereby making it possible to observe Saturday, their Sabbath, more successfully than is possible while living among Christian nations. However, the enterprise of conducting a large emigration of Jews into Syria is opposed strenuously by the Sultan of Turkey, who has fears lest such colonization would prove harmful to the interests of the Turks and Mohammedans.

The latest estimates place the Jewish population of the world at 11,800,000. If all these people could be brought together in some land having favorable climatic conditions and an abundance of natural resources, it would seem that their hopes of building an independent nation could be realized. This is made even more feasible when it is considered that collectively these people are in possession of vast wealth and progressive intelligence, and that they include doctors, teachers, artisans, traders, agriculturists, and laborers. However, it is doubtful whether the rich would be willing to leave the country in which they now enjoy abundance and equal political rights with others, and whether the poor would be able to defray the expenses of transportation to the country selected for settlement.

Several examples of successful experiments in Jewish colonization may be cited. For instance, the Jewish Colonization Association purchased 325,000 acres of arable land in Argentina, where about 15,000 Jewish settlers founded homes in the period between 1898 and 1918. The Zionists held a general congress in London, England, in 1900, at which 500 delegates attended. They represented several thousand Zionist societies and came from all countries in the world. This congress was one of many successful meetings held both before and since, all of which have operated to cement the bond of sympathy existing among the representatives coming from different countries. Among the Jews are many who think that they should seek an enlargement of their influence in each country instead of venturing on an enterprise so vast as the building of an independent state.

ZIRCONIUM (zĕr-kō′nĭ-ŭm), a rare metal discovered by Klaproth in 1789, so named from being found principally in the mineral called zirzon. The latter is a silicate of zirconium and occurs in various parts of Ceylon, Norway, and Ireland. Berzelius first obtained zirconium in the isolated state in 1824. It is gray, solid, somewhat brittle and combines with oxygen to form a dioxide, which is a white tasteless powder. Zirconium is used in various forms with other metals to construct the mantle of the Welsbach gas burner, by which a bright colorless flame is obtained.

ZISKA (zĭs′kȧ), or **Zizka, John,** famous Hussite leader, born near the castle of Trocsznov, Bohemia, about 1360; died at the castle of Przibislav, Oct. 12, 1424. He descended from a noble family and became a page to King Wenceslas of Bohemia, but afterward joined the military service against the Teutonic Knights. In the decisive Battle of Grünwald, near Tannenberg, Germany, he fought on the losing side, but was highly rewarded by the king for great bravery. He was an adherent of the Hussite doctrine and, after the murder of John Huss, became eminent as an active advocate of the new faith. In 1419 he was chosen as leader of the Hussites, largely because of his gallantry in the Hungarian wars against the Turks, and, when Emperor Sigismund attempted to obtain the throne of Bohemia, Ziska made a stubborn resistance. It soon became apparent that the conquest of Bohemia could not be accomplished, hence Sigismund proposed a treaty by which Ziska should succeed King Wenceslas as governor of Bohemia, that sovereign having died while the conflict was raging. However, he died before the treaty was concluded and was buried at Czaslav.

ZITHER (zĭth′ẽr), a musical instrument used extensively among the Germans of the Alps in Europe, so named from the word *zither,* meaning to shiver. It is the modern successor of the ancient *cithara* of the Greeks and is supposed to be identical with the psaltery mentioned in the Bible. The form is that of a flat stringed instrument, with a shallow resonance box, and is fitted with two sound holes and 32 or more strings. The strings consist of five melody, twelve accompaniment, and thirteen bass strings, made partly of metal and partly of gut and silk. In playing this instrument, it is placed on the knees or on a table, and the thumbs of both hands as well as the first, second, and third fingers are used. A partially open ring, used to strike the melody strings, is worn on the thumb of the right hand and takes the place of the bow used in playing the violin. The zither is very popular in the Tyrol and in Austria.

ZITTAU (tsĭt′tou), a city of Germany, in Saxony, fifty miles southeast of Dresden, with which it is connected by railway. It occupies a fine site on the Mandau River and is populated almost entirely by Protestants. The chief buildings include the Byzantine Church of Saint John, a fine courthouse, the public library of 40,000 volumes, and several secondary schools. Among the manufactures are paper, machinery, bicycles, cotton and woolen goods, earthenware, and dyestuffs. It carries a large trade in bituminous

coal, which is mined in the vicinity. Population, 1905, 34,719; in 1920, 37,084.

ZITTEL, Karl Alfred, geologist, born at Bahlingen, Germany, in 1839; died Jan. 6, 1904. He studied in Paris and Heidelberg and became professor of geology at the University of Vienna, in 1863. In the same year he was chosen professor of mineralogy at the Karlsruhe Polytechnic School, was appointed to the chair of paleontology at Munich in 1866, and accompanied the expedition under Rohlf to Egypt in 1873. Subsequently, in 1899, he became president of the Bavarian Academy of Science. His publications include "Handbook of Paleontology," "The Sahara," "History of Our Knowledge of Paleontology at the End of the Nineteenth Century," and "Geology and Paleontology of the Libyan Desert."

ZODIAC (zō'dĭ-ăk), an imaginary belt encircling the heavens, extending about 8° on each side of the ecliptic, 16° in width, and containing the paths of the moon and planets. It is impossible for the moon and the larger planets ever to travel outside this belt. Early astronomers divided it into twelve parts, called *constellations,* and designated them by certain arbitrary signs, termed *signs of the zodiac.* The signs indicate equal parts of 30° each, which 2,000 years ago corresponded to twelve constellations bearing the same names. Now each constellation is in the sign that has the name next following that of the constellation, this being due to the precession of the equinoxes. The signs of the zodiac, as they appear at present in relation to the seasons of the year, are as follows:

♈ Aries	Spring Signs.		♎ Libra	Autumn Signs.	
♉ Taurus			♏ Scorpio		
♊ Gemini			♐ Sagittarius		
♋ Cancer	Summer Signs.		♑ Capricornus	Winter Signs.	
♌ Leo			♒ Aquarius		
♍ Virgo			♓ Pisces		

The ancients named the signs from the constellations in the following order: *Arics,* the Ram; *Taurus,* the Bull; *Gemini,* the Twins; *Cancer,* the Crab; *Leo,* the Lion; *Virgo,* the Virgin; *Libra,* the Balance; *Scorpio,* the Scorpion; *Sagittarius,* the Archer; *Capricornus,* the Goat; *Aquarius,* the Water Bearer; and *Pisces,* the Fishes. These names were derived from the fanciful similarity between the supposed configuration of the stars and the objects designated. When Hipparchus observed the constellations at Rhodes, about 150 B. C., they coincided with the signs of the zodiac named above, but the precession of the equinoxes in space has caused them to fall back, or westward, about 30°, hence the sun enters Pisces on March 20 instead of Aries as formerly. The revolution will be complete in a period of about 25,868 years from the time observations were made by Hipparchus, when the sign and constellation of Aries will again coincide.

ZODIACAL LIGHT (zō-dī'ā-kạl), a faint light frequently seen after sunset on clear evenings in the winter and spring, and before daybreak from September until January. It is triangular in appearance, its base being on the horizon, and its greatest length extending along the path of the sun. In our latitude it is seen most clearly on favorable evenings of winter and spring on the western horizon, when it extends back along the path of the sun, but within the tropics it sometimes rivals the Milky Way. The light should be looked for from a half hour to an hour before sunrise or after sunset. Theories differ as to the origin of the zodiacal light, but the one most probably true is that it is composed of an immense number of meteroids, reflecting the sunlight, and which are so small that their united luster is barely distinguishable.

ZOLA (zō'lȧ), **Émile,** eminent novelist, born in Paris, France, April 2, 1840; died Sept. 29, 1902. He studied at the Lycée Saint Louis, engaged in a book publishing establishment, and contributed to the *Figaro, The Voltaire,* and other periodicals. In order to come in touch with the numerous phases of life in Paris, he visited the huts and hovels of the poorer classes. This caused him to become a powerful delineator of character and a close student of conditions. Soon after he became recognized as an efficient novelist. On several occasions he followed the example of Eugene Sue by putting on ragged clothes and visiting the slums to view the scenes of crime, thus enabling him to depict them with remarkable realism. He was made a chevalier of the Legion of Honor in 1891, and two years later visited London at the invitation of the London Institute of Journalists. In 1895 he visited Rome and in the same year published his "Rome," which contains a vivid description of the court maintained by the Pope. He attracted general attention in 1898 by publishing a letter in which he asserted that the general staff of the army had conducted a partial trial in the case of Captain Alfred Dreyfus. For this he was brought to trial and a verdict was rendered against him, but the whole affair ended in finally obtaining justice for the officer in whose defense he had written. His chief writings include "La Confession de Claude," "Les Mystires de Marseilles," "An Bonheur des Dames," "La Docteur Pascal," and "Contes à Ninon."



ÉMILE ZOLA.

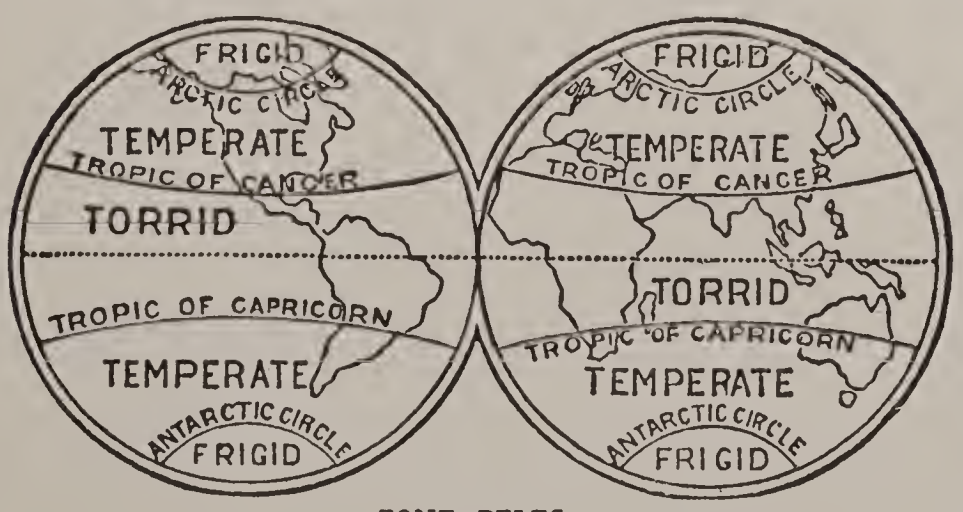
ZOLLICOFFER, Felix Kirk, soldier, born in Maury County, Tenn., May 19, 1812; died Jan. 19, 1862. His grandfather, George Zollicoffer, came from Switzerland and served as captain in the Revolutionary War. He attended the public schools, became a printer, and established a newspaper at Paris, Tenn. Later he published periodicals in Alabama, but took part in the Seminole War of 1837. Subsequently he

became identified as a leader in the Whig party, was elected State senator in 1849, and after 1853 served three terms in Congress, where he gained a reputation as a debater. In 1861 he was a delegate to the peace conference, but joined the Confederate service in the same year, with the rank of brigadier general. He commanded a force of 2,000 at Mill Springs, Ky., where he was attacked by the Federals under General Thomas. In the meantime he was succeeded in command by General Crittenden. While inspecting the position of the enemy, after having ordered an advance, he was mortally wounded.

ZÖLLNER (tsēl′nēr), **Heinrich,** composer, born at Leipsic, Germany, in 1854. After studying law, he pursued courses in music at the Conservatory of Leipsic and in 1878 was musical director at Dorpat. He promoted several musical associations and in 1889 toured France and Italy with a number of associates. In 1890 he conducted popular concerts in New York and other cities of the United States, and subsequently returned to Leipsic as musical director at the university. He is the author of several musical productions. His works embrace the cantata entitled "The New World," the oratorio "Luther," and the operas "Faust," "At Sedan," "Frithjof," and "In the Year 1870."

ZOLLVEREIN (tsŏl′fe-rīn), a customs union established in 1818 by the German states for fiscal purposes under the leadership of Prussia. It was organized to equalize tariff rates and to overcome the inconveniences caused by the collection of tariffs when making transportations of products either among the different states or receiving imports from foreign countries. This commercial union paved the way to political consolidation and the establishment of the present empire. At the formation of the new empire, in 1871, several free cities were not included, but the free ports were brought into the union in 1888. In this way the original zollverein was superseded by the imperial customs and the freedom of trade became established between the different states and cities.

ZONE, in geography, a region of the earth inclosed between two parallels of latitude. The



ZONE BELTS.

term is applied specially to one of the five divisions of the earth's surface, which take their names from the prevailing climate. They are the North Frigid Zone, North Temperate Zone, Torrid Zone, South Temperate Zone, and South Frigid Zone. Since the axis of the earth is inclined 23½° to the plane of the ecliptic, the Arctic Circle and the Antarctic Circle are located 23½° respectively from the North and South poles, and the tropics of Cancer and Capricorn are situated respectively that distance north and south of the Equator. The region lying within the Arctic Circle is called the North Frigid Zone, and the region within the Antarctic Circle is designated the South Frigid Zone. The Torrid Zone is between the tropics of Cancer and Capricorn; the North Temperate Zone, between the Arctic Circle and the Tropic of Cancer; and the South Temperate Zone, between the Antartic Circle and the Tropic of Capricorn. Hence, measured from pole to pole, the Frigid zones have each a width of 23½°; the Temperate zones, each a width of 43°; and the Torrid Zone, 47°, making a total of 180°. In the illustration is shown the zone belts of the earth, together with the location of the land masses and oceans. The term *zone* is applied in natural history to well-defined belts within which certain forms of animal or plant life are confined, as found in ascending mountains. It applies in ordinary use to a belt of land distinguished by similar characteristics, as the corn zone, cotton zone, free-trade zone, etc.

ZOÖLOGICAL GARDEN (zō-ŏ-lŏj′ĭ-kal), an inclosure maintained for the development and study of animal life, usually in connection with a public park. The first establishment of this kind was planned by Jardin des Plantes in Paris, France, where a fine garden of this kind was founded in 1804. This institution was soon succeeded by other gardens of a similar kind in the leading countries of the world, but especially in Europe and America. The finest zoölogical gardens maintained at present are in Germany and the one at Berlin is the most extensive establishment of the kind in the world, both in the buildings and the collections of animals. Other celebrated gardens of this kind are maintained in Vienna, Antwerp, London, Amsterdam, Tokio, Melbourne, and Rio de Janeiro. In most cases they are owned and operated by stock companies or zoölogical societies and visitors who are not members are required to pay a nominal admission fee upon entrance. However, many are free exhibitions of living animals and in many cases the institutions include extensive collections of rare plants, usually brought together from many lands. The Zoölogical Society of London has a membership of about 2,350, each member being charged annual dues amounting to $15.00, and the receipts are further augmented by the collection of nominal fees from visitors who do not belong to the society.

In Canada and the United States distinctly

zoölogical gardens are not numerous, but in many parks are collections of animals. Cincinnati, Ohio, has one of the leading establishments of this kind in America. It consists of a fine collection in the eastern part of the city, located on beautiful and elevated grounds. In most cases the zoölogical collections are in parks, such as Lincoln Park, Chicago; Bronx Park, New York City; Highland Park, Pittsburg; and Forest Park, Saint Louis. The National Zoölogical Park at Washington, D. C., was established by Congress in 1889 and is under the direction of the Smithsonian Institution. The leading parks of cities in Canada have similar collections of animals, such as Standley Park, Vancouver. Well-equipped zoölogical collections are maintained in Ottawa, Montreal, Quebec, Toronto and other cities of Canada.

ZOÖLOGY (zō-ŏl'ō-jў), (a word derived from the Greek *zoön,* an animal, and *logos,* discourse), the branch of biology which embraces the study of animals, with reference to their structure, functions, distribution, and classification. It is quite difficult to draw a precise line between zoölogy and botany for the reason that some organisms, low in the scale of life, are of such structure as to be classified by some writers as animals and by others as plants. The subject-matter covering a large field, it is classified into various branches, and these are studied in many schools as distinct sciences. Even in ancient times man gave attention to the study of the lower animals. Thus, Solomon speaks of the habits of the ant, Jeremiah alludes to marine mammals, and Job refers to the peculiar method by which the ostrich incubates its eggs. Many zoölogical facts were recorded by Aristotle and Pliny, but no well-defined attempt was made at scientific classification of animals until in the 18th century. However, many modifications have been made in the study and classification of animals, especially in the 19th century, and it is probable that there are still numerous errors to be rectified by the naturalists of the future.

The chief divisions of zoölogy include *mammalogy,* treating of mammals; *herpetology,* of reptiles; *entomology,* of insects; *ornithology,* of birds; *ichthyology,* of fishes and lower aquatic vertebrates; *conchology,* of mollusks; *arachnology,* of spiders, scorpions, and related forms; *helminthology,* of worms; *crustaccology,* of the crustaceans; *spongiology,* of the sponges; and *protozoölogy,* of the protozoa. These departments were made in accordance with different forms of animal life. However, besides these may be mentioned certain divisions of the subject-matter that refer to aspects in animal life which are applicable to any one or all life forms. Among these are *physiology,* treating of animal functions, such as nutrition, reproduction, and innervation; *anatomy,* which investigates the position and relation of organs and parts; *embryology,* dealing with development from the ovum to maturity; and *classification* or *taxonomy,* which classifies animals into natural groups. Among the names famous in zoölogical research are those of Agassiz, Darwin, Haeckel, Cuvier, Max-Müller, Harvey, Johannes Müller (1801-1858), and Linnaeus. See **Amoeba; Animal; Birds; Embryology; Fish; Insects; Mammalia; Reptiles; Vertebrata.**

ZOÖPHYTE (zō'ō-fīt), the name applied by Cuvier to the forms of animal life that more or less resemble a plant in external form or mode of growth, as a coral, sponge, or polyzoan. The animal organisms belonging to this class are fixed to a definite object or spot, as a rock or shell. Many zoöphytes have a close external resemblance to flowers, but they are true animals instead of massive plants.

ZOROASTER (zō-rō-ăs'tēr), the founder of the Magian or Parsee religion, the national religion of the ancient Perso-Iranian people. Writers generally agree that he was born in Bactria, but they disagree widely as to when he lived. Ctesias states that he was a contemporary of Semiramis, hence he must have flourished about 2150 B. C., though others regard him a contemporary of Moses, hence assign him to about 1500 B. C. His religious doctrines are set forth in the Avesta, or Zend-Avesta, and embody a form of dualism as regards the Deity. It was thought that two spirits existed at the beginning of time, the good being known as *Ormuzd* and the evil spirit as *Ahriman.* The Zend-Avesta records that Ormuzd revealed the duties of man to Zoroaster and that he is the giver of life and all that is true and holy. Ahriman, on the other hand, is the exponent of darkness and death. This world is represented as the scene of a conflict between the two spirits, but it is promised that Ormuzd will eventually overcome Ahriman and sink him and his followers into darkness, while the faithful are promised perpetual life and bliss. It further teaches that the whole duty of man is to obey the word and commandments of God. Those who remain faithful are promised their reward, while the disobedient are to die the death of the lost. Man is taught the duty of prayer, since God is merciful to those who worship Him and answers the prayers of the good. The Zoroastrian religion prevailed for centuries in Persia, but was displaced there by Mohammedanism after the invasion of 636 A. D. It has since merged largely into the sun and fire worship and is adhered to by the Parsees of Persia and India.

ZOUAVE (zwäv), the name of a light-armed infantryman, originally part of a corps recruited from the Kabyle tribe of Zouaoua, in Algeria, but now a part of the regular army of France. The French occupied Algiers in 1830, when they incorporated the zouaves into their army, but later gradually eliminated the native element from the corps. After 1840 the zouaves were strictly French soldiers, bearing the native

name and wearing the native dress. The apparel is Moorish, but the arms and discipline are European, and recruits are obtained by voluntary enlistment. Zouaves wear a loose jacket and waistcoat, usually of blue cloth which is ornamented with yellow braid, a yellow-tasseled fez cap, loose trousers, yellow leggings of leather, and white or yellow gaiters. They are armed with carbines or rifles and carry a sword bayonet. In the American Civil War the zouave uniform was popular on the side of the Northern forces, several regiments of which were uniformed as zouaves.

ZSCHOKKE (tshŏk'kę), **Johann Heinrich Daniel**, noted historian, born in Magdeburg, Germany, March 22, 1771; died in Biberstein, Switzerland, June 27, 1848. He studied in the gymnasium of his native city, but in 1788 left that institution to join a company of strolling players. Subsequently he studied in the university at Frankfort-on-the-Oder, where he pursued courses in literature, history, theology, and the sciences, and afterward was a tutor to a family in that city. In 1795 he traveled in Germany, France, and Switzerland, and soon after founded a school in the canton of Grisons, Switzerland. Three years later he published "History of the Free State" and for some time was chief of the department of education of several cantons, including Aargau, Zug, Uri, and Schwyz. He resigned his offices in 1801 and retired to Biberstein in Aargau, but was recalled to public life in 1803, when a new federal union of the Swiss states was established by Napoleon. His historical works include "Bavarian Stories," "Swiss History for the Swiss," "History of the Contest and Fall of the Mountain and Forest Canton," and "History of Switzerland." Among his general works are "The Creole," "Hours of Meditation," and "The Fugitive in Jura."

ZUBLY, John Joachim, clergyman, born in Saint Gall, Switzerland, in 1725; died in Savannah, Ga., July 23, 1781. He was liberally educated in Switzerland and soon after completing his studies came to America. In 1758 he was chosen pastor of the Presbyterian church in Savannah, where he was a regular pastor for several years, and in 1770 was granted the degree of doctor of divinity by Princeton. He was chosen a delegate to the Continental Congress in 1774, where he took an active interest in promoting the American cause, but afterward sided with the Tories on the ground that he deemed a republic inferior to a monarchy. He was banished from Savannah in 1777, but returned when Sir James Wright was reinstated as royal governor of Georgia, and continued in pastoral work until his death. Joachim and Zubly streets in Savannah were named from him.

ZUCCARO (tsŏŏk'kȧ-rō), **Taddeo**, painter, born in Sant' Angelo, Italy, in 1529; died Sept. 2, 1566. He took up the study of painting at Rome while a boy and soon established a reputation as a fresco painter. Julius III. and Paul IV. employed him to execute works on a large scale. Among his leading frescoes are a series in the palace at Caprarola illustrating the achievements of the Farnese family. These were afterward engraved in 45 plates. His younger brother and pupil, Federigo Zuccaro (1543-1609), painted a series of 300 figures in the leading cathedral of Florence. In 1574 he went to England, where he painted portraits of Mary, Queen of Scots, and of Queen Elizabeth. Later he founded an academy of art in Rome. He produced many fine examples of sculpturing and architectures.

ZULU (zo͞o'lo͞o), the name of a warlike branch of the Kaffir race, which is native to South Africa. Originally the Zulus inhabited a part of the region included in Natal and the country toward the northeast. These people are classified as distinct tribes, differing somewhat in language and minor characteristics, but all are noted for their high degree of physical and intellectual development. Though ordinarily social and amiable, they are good warriors and resisted European encroachment upon their territory with marked heroism. The Zulu government was a form of democracy, in which the chiefs were elected by popular suffrage and held office during the time sanctioned by the people. They practiced a form of polygamy, reared domestic animals, cultivated the soil, and made utensils of wood, stone, and clay. Many of them are now engaged in civilized arts, such as farming, stock raising, mining, and fishing, and some have made considerable advancement in education. Several conflicts between the Boers and the Zulus occurred at different times, but they lived quite peaceably most of the period up to 1879, when the British came in conflict with Cetewayo, King of Zululand. The British under Lord Chelmsford crossed the Tugela and entered Zululand, but were defeated with a loss of 800 men and compelled to retreat. Later the Zulus were defeated. Cetewayo was captured soon after and died in 1884.

Zululand, the chief seat of the Zulus, is now a province of the British colony of Natal. It lies between Natal and Portuguese East Africa, immediately east of the Transvaal, and has an area of about 12,500 square miles. Its population is given at 181,500, including about 1,200 whites. The region was formally annexed to Natal in 1897 and has since been divided into twelve magisterial districts. Agriculture is the chief occupation of the natives, but they also engage in stock raising and trading. The country has considerable mineral wealth in gold, silver, coal, iron, copper, lead, and asbestos. Zululand has been reserved for the natives, only one district being opened to the whites. The Boers invaded the province at the time of the Anglo-Boer war from 1899 to 1900. The province is represented by one delegate in the legislative council at Natal and by one member in the legislative assembly.

ZUÑI (zo͞o′nyė̆); a range of mountains in New Mexico, in the west central part of that political division. These mountains are intersected by the 108th meridian west from Greenwich and lie between the 35th and 36th parallels of north latitude. The general altitude is 6,500 feet. Within these mountains is the village of Zuñi, about 40 miles southwest of Fort Wingate, which is the largest of the Pueblo villages. These Indians were first met with by the Spaniards, in 1539, and they still retain their former modes of weaving, agriculture, and house building. They belong to the cliff-dwelling Indians and constitute a distinct linguistic stock. These natives call themselves *Ashiwi,* but they are generally known as the Zuñi among the whites. At present they have several villages and number about 1,650.

ZURICH (zo͞o′rĭk), a lake in Switzerland, situated about forty miles southwest of Lake Constance and surrounded by the cantons of Zurich, Schwyz, and Saint Gaul. Its length is about 25 miles; breadth, two to three miles; and the greatest depth, 512 feet. The lake is noted for its fine fisheries and beautiful scenery. Its overflow is carried by the Limmat River to the Rhine. The city of Zurich is near its outlet. In its vicinity are fine gardens, orchards, and farms.

ZURICH, the largest city of Switzerland, capital of the canton of Zurich, at the junction of the Limmat and Sihl Rivers. The city has excellent railroad facilities and has had a remarkable growth in population and industries in the past century. Though the older streets are narrow and tortuous, many notable improvements have been wrought within the last half century, and the city is fast becoming one of the most beautiful of European trade emporiums. The chief buildings include a cathedral founded in the 11th century, a federal polytechnic school, the city hall, and numerous public schools and churches. It has a university which is attended by 1,450 students. In connection with it is a fine collection of botanical specimens and engravings and near by is an observatory. Many of the streets are paved substantially with stone. They are improved by gas and electric lighting, sewer drainage, waterworks, and an extensive system of rapid transit. It has a large public library and may be regarded the intellectual center of German-speaking Switzerland. The manufacture of machinery and cotton spinning are two leading industries, but the silk trade is the most important commercial enterprise. The silk exported annually aggregates a value of $15,500,000. Other manufactures include steam engines, boilers, paper, chemicals, flour, clothing, tobacco products, earthenware, musical instruments, and utensils. Zurich was the capital of Switzerland until 1848. Austria, France, and Italy signed a treaty of peace here in 1859. Population, 1920, 207,161.

ZUYDER ZEE (zī′dẽr zē′), or **Zuider Zee,** an inlet from the North Sea, on the northwestern coast of Holland, including an area of 1,350 square miles. It formed a marshy lake at the time of Roman occupation, when it was called *Flevo,* and a small river carried the water to the sea. Subsequently the dikes were broken by several inundations, since which time it has become an arm of the sea. Near its entrance are the four islands of Terschelling, Vlieland, Ameland, and Texel. The government of Holland is now actively prosecuting the work of redeeming Zuyder Zee by means of dikes and canals, which improvement is estimated at a cost of $50,000,000.

ZWICKAU (tsvĭk′ou), a city of Germany, in the kingdom of Saxony, forty miles south of Leipsic. It is finely situated on the Mulde River, has large manufacturing interests, and is connected with other cities by a number of important railroads. Four bridges cross the river. The railroad station, which is one of the largest in Germany, includes a number of important buildings. These railway buildings and the machine shops cover about eighty acres. The city is the seat of a penitentiary, has excellent schools and churches, and is the center of a large transit trade. Among the chief manufactures are machinery, glass, chemicals, porcelain, clothing, textiles, and dyestuffs. In the vicinity are extensive coal mines, which employ 12,000 persons. Gas and electric lighting, pavements, rapid transit, and a fine library are among the municipal facilities. Zwickau was mentioned as early as 1118. Population, 1905, 68,502; in 1920 73,538.

ZWINGLI (tsvĭng′lė̆), **Ulrich,** eminent reformer, born in Wildhaus, Switzerland, Jan. 1, 1484; died in battle Oct. 11, 1531. He was the son of an officer in his native town, studied at Berne and Basel, and subsequently attended the University of Vienna. In 1506 he became pastor in Glarus, a town near his birthplace, and in the meantime devoted himself to the study of classics and the New Testament. His devotion to study and eminent ability as a pulpit orator soon gave him a wide reputation, and in 1518 he was called to the pastorate of Zurich. He was opposed by many of the monks, but the magistracy of Zurich permitted him to preach the Bible without human additions in all parts of the country under their jurisdiction. The Reformation assumed a formidable aspect in 1522 and Zwingli preached to vast congregations on piety and patriotism, secured an abolition of the law preventing priests from marrying, and obtained other reforms. A general agreement on matters of faith existed between Zwingli and Luther, except on the question whether the body of Christ is really present in the Lord's Supper, Luther affirming that belief and Zwingli holding the view that bread is used merely as a symbol.

In 1531 a war broke out between the Protestant and Catholic cantons and Zwingli went into

the contest as a chaplain, but was slain at Kappel while taking care of a wounded soldier. Though adversely criticised for holding to the virtue of civil war in defense of the faith and common rights, he defined his position by expressing the view that there should be religious liberty and that to defend freedom of worship was battling for the cause of Christ. His chief writing is a work entitled "Of the True and False Religion." He wrote 67 theses and many letters, but formulated no definite system of theology. Many of his works have been translated from the German by Dr. Edward Zeller (born in 1814) and other writers.

ZWOLLE (zvŏl'lę), a city in the Netherlands, capital of the province of Overyssel, on the Zwarte Water, about fifty miles northeast of Amsterdam. It has railroad facilities and is connected by the Willemsvaart Canal with the Yssel River. The Saint Michael's church is its most noted building, which contains many fine paintings and a celebrated organ. Other edifices of note include the townhall, a museum of natural history, and several art and industrial schools. The streets are paved with stone and are traversed by street railways. Among the improvements are electric lighting, a public library, and many promenades. It has a considerable market in cattle, cereals, and fish. The chief manufactures are clothing and ships. Zwolle belonged to the Hanseatic League and joined the United Provinces in 1580. Population, 1907, 34,160; in 1920, 35,791.

PRACTICAL EXAMINER

IN THE

FUNDAMENTALS OF AN EDUCATION

This department is commended to all who desire to widen their fund of general knowledge. It is based upon the underlying principles of mental culture and research. Lists of questions used by the Federal government and principals and superintendents of schools were consulted freely in preparing this feature of the work. Students who are contemplating an examination for a civil service position or a certificate to teach in the schools will find these questions of incalculable value. These interrogatives are more than a mere list to arouse curiosity, but, instead, the numbers on the right hand *indicate the pages* where the answers may be found. The material was carefully selected and a helpful fund of knowledge is definitely indicated.

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Who was the first King of Israel and who succeeded him? 2536

BIOGRAPHY

DEFINITION: Biography is the department of literature which treats of the lives of persons.

Contrast the meaning of biography and autobiography 296
What American is known as "the Expounder of the Constitution?" 3114
Why have the remains of Shakespeare not been removed to Westminster Abbey?..... 2603
What famous inscription is found on the monument of Benjamin Jonson?..... 1470
What Canadian statesman did much to make the transcontinental line of the Canadian Pacific Railway a possibility?..... 1660
Give an account of Emilio Aguinaldo.....41, 2191
Who was the husband of Queen Victoria? What rank did he hold in the British army?.... 53
Speak briefly of the life and successes of Michael Angelo 101
When and why was John Brown executed?..... 384
Was Henry Clay a supporter of the War of 1812? What is he often called?..... 597
Who established the Cooper Union and for what purpose was it founded?..... 667
What eminent writer was a prominent factor in the Dreyfus trial?..... 3223
Who organized the state of Deseret?..... 3210
Name the war governor of Illinois..... 3202
Give a short account of the life and work of Aali Pasha 1
Who were candidates for President at the time John Quincy Adams was elected?..... 19
Name the Pilgrim Father who first set foot upon Plymouth Rock..... 59
What noted British writer built the country home known as Abbotsford?.....3, 2565
How did P. T. Barnum make his first great financial success? 234
What eminent author was an active organizer of the Free-Soil party?..... 391
Who organized The American Society for the Prevention of Cruelty to Animals?.....278, 716
Who was the founder of Herrnhut and Bethlehem? 3221
Give an account of three noted Americans by the name of Abbott..... 3
Who wrote his own epitaph long before his death? 1056
What Japanese statesman did much reform work?..... 3201
What is said of the wife of Socrates?..... 3194
Whose doctrines were formally condemned thirty years after his death?..... 3191
Of what colony was Roger Wolcott governor for several years?..... 3173
Who was the first emperor of modern Germany?..... 3152
Whose speeches are counted among the American classics? 3114
When and whom did George Washington marry?..... 3097
Who is noted as the most eminent Lutheran divine of America?..... 3078
Who was the first King of United Italy?..... 3043
What President of the United States was the son of a President?..... 19
What eminent Greek king studied three years under Aristotle? 62
Who was the fourth president of the Mormon Church? 3179
Whom did the Duke of Wellington marry?..... 3120
Who was the first president of Amherst College?..... 3114
Name the principal writings of Frances E. Willard 3150
What eminent naturalist had a profound influence upon scientific knowledge?..... 34
Of what colony was John Winthrop governor for a long time?..... 3166
Who was Governor General of Cuba immediately preceding the Spanish-American War?.... 3130
What statesman is known as the "Watch-dog of the Treasury?"..... 3089
Who reigned longest of the English sovereigns?..... 3046
Who is noted as the leading factor in promoting the Tuskegee Institute?..... 3095
Name some famous women.....20, 58, 284, 333, 1707, 3097
Who wrote "Rocked in the Cradle of the Deep?"..... 3150
Who was called "The Little Magician?"..... 3016
Give an account of Count Tolstoi and speak of his writings..... 2891
Tell of the peculiarities of Henry David Thoreau 2868
Give an account of the travels and writings of Bayard Taylor 2827
With whom did W. T. Sherman make his home after the death of his father?..... 2613
Where and when was William Shakespeare born?..... 2602

Name a powerful Queen of Assyria and Babylonia 2584
What British novelist was an ingenious story-teller? 2565
Relate the legend associated with Tannhäuser..... 2814
Who was expelled from the United States Senate in March, 1861?..... 2895
What Union general was called the "Rock of Chickamauga?" 2865
What prominent American visited Palestine in 1889? 2811
What noted poet was drowned in the Gulf of Spezia? 2611
Give a brief outline of the public life of Carl Schurz 2557
What English writer defended Pre-Raphaelitism?..... 2464
Who made large donations to the public library of New York?..... 2879
When was Tennyson made poet laureate and whom did he succeed as such?..... 2845
What can you say of the life and public work of John Sherman?..... 2613
Name an eminent French letter writer of the 17th century..... 2596
In what battle was General Santa Anna severely wounded? 2524
Give an account of the Siamese twins..... 2625
What eminent French lady exercised much influence as a Girondist?..... 2437
Name a noted admiral who died at the time of his greatest victory..... 1920
What explorations were made by Nils Adolf Nordenskjöld? 1983
Who is at present the King of Sweden and when was he crowned?..... 1222
Was Pericles a benefactor of Athens? What is the time in which he lived called?..... 2159
What navigator became closely associated with the colonization of Virginia?..... 2371
What marshal of France had five horses shot under him in the Battle of Waterloo?..... 1966
Name an eminent supporter of the so-called higher criticism..... 2110
Give a list of important discoveries made by Louis Pasteur 2119
What were the causes that led to the execution of Robespierre? 2429
Review briefly the events in the life of Whitelaw Reid 2393
What can you say of the government of Pennsylvania under William Penn?..... 2149
What army officer was remarkable for his vivid imagination? 1869
When and in what battle was General Montcalm slain? 1836, 2350
Give an account of the life and work of Mohammed 1817
What eminent English poet was blind?..... 1791
Name a prominent financier of the Revolutionary period? 1853
Who was the leading strategist at the time of the Franco-German War?..... 1823

CANADIAN HISTORY

DEFINITION: Canadian history is the story of the settlement and progress of British North America.

Who discovered the coasts of New Brunswick and Newfoundland in the 10th century? 456, 1565
Name six noted explorers whose names are connected with the early history of British America 209, 427, 450
By what treaty was Canada transferred from the French to the British?.....457, 2108
What was the import of the Quebec Act of 1774?..... 457
About how many loyalists removed from the American colonies to Canada at the time of the Revolution? 457
In what war were the battles of Lundy's Lane and Queenstown Heights fought?.....1645, 2353
In what year and when was the Dominion of Canada created? 457
What celebrated Indian chief aided the British in the Battle of the Thames?.....2832, 2854
Name the provinces and other political divisions of Canada..... 455
What are the forms of government in Newfoundland and in New Brunswick?.....1935, 1938
Which is the largest Province of Canada and which is the most populous?.....455, 2039
When was British Columbia admitted into the Dominion? 378; Manitoba?..... 1697
When and where did the Riel Rebellion occur?.....2419, 2534
What was the Fenian movement? The Fenian invasion of Canada?..... 986
When and by whom was Ottawa selected as the capital of Canada?..... 2066
Explain the meaning of the terms Upper Canada and Lower Canada.....457, 2040, 2350
What are the Maritime Provinces? Which was the last to enter the Dominion?..... 457
Give the causes and the results of the revolt led by Louis J. Papineau.....457, 2100
When and by whom were two celebrated attacks made upon Quebec?..... 2350
Was the Hudson's Bay Company an important factor in developing Canada?.....1332, 2464
What extensive industries are promoted in Canada?.....54, 453, 1514, 1644, 2038, 2936
What two great railways extend across the continent through Canada?..... 454
Name at least six prominent statesmen.....838, 1204, 1549, 1659, 1664, 2757
By what treaty and when was New Brunswick ceded to the British?..... 1935
When was the Ashburton Treaty agreed upon and what did it settle?..... 161
Which boundary of the United States was settled by the treaty of 1846?..... 458
Give the causes, name the leading battles, and state the results of the War of 1812..661, 2350, 3084
In what year and how was the Canadian-Alaskan boundary settled? 51, 79
What dispute between Canada and the United States was submitted for arbitration to the Emperor of Germany?..... 378
When were Alberta and Saskatchewan organized and admitted to the Dominion?....55, 457, 2534
To what British possession does the eastern coast of Labrador belong?.....1526, 1937

What are the principal provisions of the Quebec Act? 457
What were the Clergy Reserves?..... 600
Did the Treaty of Paris benefit the literature of the country? 456

CIVIL GOVERNMENT

DEFINITION: Civil Government is the science which treats of the civil duties of the citizen and the authority of the state or nation.

Name and define the principal forms of government 1173
What are the duties of the President of the United States? 958, 2987
Explain the government of the Dominion and the several provinces..... 455
(See subheads *government* in the articles that treat of the provinces.)
Define impeachment and name some prominent men who were impeached.....1370, 1371
What is international law and how is it applicable? 1397
Why is the Australian ballot so named? Is it used extensively? 193
Define localization and centralization..... 522
Of what two houses does Congress consist? How many members in each house?..... 653
Define constitution. How can a constitution be changed? 661
Are the President and Vice President chosen by a direct vote? 888
Define the executive branch of government..... 958
What form of government is best for an intelligent people? 1172
How are the State governments constituted?..... 2976
What is the basis of representation in the House of Representatives?.....653, 2976, 2984
What are letters of marque and reprisal?..... 1575
What is an income tax? Has that form of taxation been imposed by the United States? What decision regarding this tax was rendered by the Supreme Court?..... 1372
What is a jury? How many classes are there?..... 1480
What is an aristocratic form of government?.....140, 1173
Trace the stages of civilization. Give the causes of intellectual progress..... 588
Define debt. Is the possibility of going into debt an advantage? 767
What is an election? How are elections governed? 888
Define government. Is it an essential element in civilization? 1172
How many electors has each State according to the law of 1901?..... 2978
What is a direct tax? an indirect tax? an income tax? 2826
What is a grand jury? a petit jury? a coroner's jury? 1480
State the conditions of eligibility of senators and representatives.....653, 2984, 2985
What is the right of eminent domain? Why is it necessary? 912
What is it to vote? How is voting done at public elections? 3064
Name the nine cabinet offices. How are the offices filled? 425, 2991
Repeat the first sentence of the Declaration of Independence 2993
Has the rural population grown as rapidly as that of cities?..... 2975
What is a postage stamp, a revenue stamp?..... 2722
Define absolute and limited monarchies. Give examples of each..... 1824
What is a poll tax? Is its payment made a condition for voting?..... 2262
Into how many classes is mailable matter divided? Enumerate them 2291
When were the different states admitted into the Union? 2978
Define citizen and citizenship. May all foreigners become citizens?..... 587
What Vice President was elected by the Senate?.....653, 1464
Define corporation. What is a sole corporation?..... 681
What are the three most prolific sources of crime? 705
Give the titles of the principal diplomatic agents..... 802
Name and define the three branches of government 1173
What is usury? What are legal rates of interest?..... 3004
Repeat the preamble to the Constitution of the United States 2984
Explain the single tax theory. What prominent person advocated the theory?.....1117, 2641
Define majority and plurality. Illustrate..... 1682
Compare Massachusetts as to size and population.....1727, 1729
What are the conditions of eligibility to become President? 2305, 2987
How many members were in the first Senate? How many are there at present?..... 653
In what year was it decided to call the chief executive President?..... 2305
What number of members constitutes a quorum in each house of Congress?..... 2358
What is the civil service? How many offices now in the civil service list?..... 589
When do the regular meetings of Congress occur?..... 653
Name the original thirteen states..... 2978
Who was president of the convention that adopted the Constitution?.....2975, 2989, 3096
What salary is paid to the President?.....2305, 2975
What is a copyright and what may be copyrighted? 671
When was the Declaration of Independence adopted? 769, 2993
What is a patent and how much is the fee? How many patents were issued in 1907?..... 2121
When and where did the First Colonial Congress meet? 653
When were international copyrights first recognized? 671
Explain the system of government surveys..... 2782
Under whose direction is the post office system?.....2291, 2992
When were the provinces admitted into the Dominion of Canada?.....457, 1696

DISCOVERIES

DEFINITION: A discovery is the act of finding something which was previously unknown or unrecognized.

By wham and when was the North Pole discovered? 664, 2134, 2251
What simple circumstance enabled Newton to discover universal gravitation?..... 1955
Who discovered that the acceleration due to gravity is the same in all falling bodies..... 973
When and where did Columbus first reach land in America?..... 636
Who made important discoveries regarding the diseases of the silkworm?..... 2120
Name some of the discoveries of Scheele..... 2547
Who discovered that the Nile is the outlet of the equatorial lakes of Africa?..... 2704
From what discoverer was America named?..... 3038
Who discovered Vancouver Island?..... 3017
Who calculated an eclipse of the moon when eighteen years of age?..... 321
Who announced the discovery that air has weight? 234
Name the most famous explorer of the 13th century 2262
Who discovered the Virgin Islands?..... 3057
By whom and when was Jamaica discovered?..... 1434
Who discovered the X-Ray?..... 2435
What are the principal discoveries made by Galileo? 1087
Who discovered the source of the Abai River?..... 386
Who was the first to discover oxygen?..... 2073
What explorer wrote "In Darkest Africa?"..... 2726
Who discovered the Zacatecas silver deposits?..... 3215
What famous discovery was made by Robert Koch in relation to tuberculous diseases?.... 1517
Who discovered Newfoundland? When?..... 1939
Who discovered Florida?.....1018, 2269
When was the Pacific Ocean discovered by the Spaniards? 214, 2077
By whom was Lake Champlain discovered?..... 530
Who explored the coast of Maine in 1497?.....427, 1681
Name some famous Arctic explorers.....135, 2248
What explorer discovered the northwest passage?..... 2077
Who reached the farthest point north in exploring the Arctic regions?.....135, 664, 2134, 2251
Who discovered the power of steam?..... 3105
When and by whom were the Philippine Islands discovered? 1673, 2191
When was the region included in Argentina first explored? 138
When and by whom were the Solomon Islands discovered? 2673
What discoveries were made by Henry Hudson?..... 1331
Who discovered the northeast passage?.....1983, 2077
When and by whom was the magnetic North Pole discovered? 1675, 2452

ECONOMICS AND CIVICS

DEFINITION: Economics is the science of the useful application of material resources; civics is the science of civil government. (See page 2254.)

What is meant by productive labor and unproductive labor? 1525
Define income tax, property tax, poll tax..... 2826
Under what conditions does Canada levy a surtax? 731
When and where was the first customhouse established in the United States?..... 731
Define the theory of bimetallism and state when it was made a political issue..... 294
What is a board of trade? Explain what is meant by trading in margins..... 320
What is a bounty and when were bounties paid in the United States?..... 350
Where are the principal banking and money centers of Europe?..... 225
Distinguish between a private and a common carrier 491
What is meant by centralization as applied to government? 522
Define commerce. Who were the most noted commercial people of antiquity?..... 640
What are the objects of coöperation as applied to the industries?..... 667
Name the principal kinds of banks. What are clearing houses? 226
What circumstances have caused variations in the relative value of gold and silver?..... 294
Define citizen and citizenship. When do Indians become citizens? 587
Define consumption. Illustrate productive and unproductive consumption 662
Explain customs duties. How much money has been collected in the United States by these taxes? 731, 732
What are the three agents of production? Which of these is the basis of all wealth?..... 1525
Define money, barter, wampum, and coinage.....237, 620, 1825, 3079
State some of the advantages and some of the disadvantages of monopoly..... 1830
Upon what is the paper money issued by the government based?..... 1826
What is a poll tax and on whom is it levied?..... 2262
What is currency reform? Give the leading features of the law of 1900.....727, 728
Explain fully the advantages derived from the division of labor..... 806
Enumerate some of the advantages argued in favor of free trade..... 1064
What is an income tax? How much money has been collected from the income tax?..... 1372

When was the first coinage law enacted in the United States? What are the denominations of gold and silver coins? ... 620
Define credit and explain how the credit system has been beneficial ... 699
What is exchange? In exchange, must value be given for value? ... 957
Give an outline of the general objects of the labor movement of recent times ... 1526
State some of the elements that should characterize the substances used in making money. Define legal tender, token money ... 1826
Name the four leading schools of political economy and compare their teachings ... 2255
Speak of the advantages urged for a general system of protection ... 2321
What is rent and upon what does the rental value of property depend? ... 2397
Who originated the single tax theory? ... 1117, 2641
What monopolies are granted by the government to authors and inventors? ... 671, 1830, 2121
Define capital, exchange, consumption, value, production, land, and labor ... 2255
Explain the difference between a serf and a slave ... 2590
What advantages are argued in favor of the single tax system? ... 2641
What classes of property are generally exempt from taxation? ... 2827
Ought the wages of a laborer be based upon the hours employed or the results achieved? Explain the difference between nominal and real wages ... 3068
When and by whom was wampum used as money? ... 3079
Define reciprocity. Why do many English statesmen favor an imperial custom tariff? ... 2384
What are savings banks and when were they first established? ... 2538
What theory is advanced by scientific socialism? ... 2667
Define tax and outline the four principles of taxation laid down by Adam Smith ... 2826
What are trades unions and how have they benefited laborers? ... 2907
Define usury. Are contracts that provide for excessive interest collectible? ... 3004
How are the savings banks of the United States controlled? ... 2539
Did the Greeks and Romans maintain systems of slavery? ... 2650
What are the chief aims of the Christian socialists? ... 2668
How were taxes levied among the ancient nations? ... 2826
Can the rate of wages be fixed satisfactorily by statutory law? ... 3069
What threefold test is used by most writers to determine whether a commodity may be classed as wealth? ... 3109
Why are duties on exports forbidden by the United States Constitution? ... 731

ELECTRICAL SCIENCE

DEFINITION: Electrical science investigates the phenomena and laws of electricity.

Were the phenomena of electricity known to the people of ancient times? ... 892
Mention some of the principal uses of electricity ... 891, 1892
Name some conductors and some nonconductors of electricity ... 890
From whom was the ampere named? ... 91
What is a Leyden jar? For what is it used? ... 1580
From whom were the words ohm and volt coined? ... 891, 2024, 3061
When and where did A. G. Bell first exhibit his telephone? ... 269
Explain the theory of the lightning rod. Upon what does its value depend? ... 1590
How is an automobile propelled? When were automobiles first manufactured? ... 196
Can electricity be used to propel ventilating fans? ... 975
What is the purpose of an armature? ... 147
Explain the process of electrotyping. How has it aided in printing? ... 898
How many varieties of lightning are there? Give the theory of each kind ... 1590
From what town was the word magnetism coined? Why? ... 1674
Who originated the galvanic battery? For what is it employed? ... 1090
How is the strength of a magnet increased? ... 897
Where and when was the first electric street railway built? ... 895
What is an electroscope? Explain how it is made ... 891
Who invented the electric pile? What other inventions did he make? ... 405
How does the X-Ray aid in photography? ... 2201
Who built and operated the first electric street railway in the world? ... 895, 2630
What is a telephone? Explain how it is made ... 2837
Who invented the first practical telephone? ... 269, 2838
Who first demonstrated that electricity and lightning are identical? ... 1056
Can electricity be employed in plating jewelry? In gold and silver plating, what metal is taken as a base? ... 898
Name some of the men who became eminent as discoverers of electrical phenomena ... 892
What was the first message cabled on the line built from America to Europe? ... 427
What is the main difference between a dynamo and a magneto-electric machine? ... 851
Are some persons blind to the X-Ray? ... 3197
Is zinc the positive or negative element in batteries? ... 3220
What is an electric life buoy? A whistling buoy? ... 406
Explain the meaning of ampere, ohm, and volt ... 891
State the difference between arc and incandescent lights. Which kind is used mostly for street lighting? ... 893

How does electricity furnish protection against thieves? 2483
What is a long-distance telephone? When was the first line completed?..... 2838
Can motors and electric lamps be utilized on one wire without a circuit?..... 2984
What effect has an aurora borealis on the magnetic needle? 186
What current is required for a sixteen candle power incandescent lamp?..... 896
Explain static and dynamical electricity..... 890
Why has the X-Ray particular value in surgery?..... 3196
What are earth currents?..... 857
Who discovered the magnetic North Pole? When? 1675, 2452
Explain the theory of the Toepler-Holtz electric machine 894
What is said of the magnet at the Stevens Institute of Technology, New York?..... 1675
What can you say of the utility of Niagara Falls in propelling electrical and other machinery? 398, 1968

GAMES AND SPORTS

DEFINITION: Games and sports are pastimes that are played for amusement, profit, or recreation.

Why were the Olympic games beneficial to ancient Greece? 2034
What is considered the national game of the United States? Draw a baseball ground.... 240
Write an essay on yachting and mention the *Shamrock III.* 1600, 3198
Is horseback riding a healthful exercise?..... 2417
Name some of the games played with cards.....481, 499, 703, 944, 3138
Explain some of the games played between men or animals and between men and animals..353, 2361
What are athletics, delsarte, and gymnastics?.....176, 778, 1224
Write a brief description of angling? What is a decoy? 103, 770
What is falconry and when did it become popular? 971
Explain some of the general methods by which fish are caught.....103, 1924, 2922
What were the leading games and sports of ancient Rome? 92, 586, 1146
Name some of the games that are played extensively by women.....242, 1552
What games are popular in cold countries in the winter? 2625, 2888
Have the balloon and the flying machine become factors in competitive contests?.....217, 1024
What sports are popular on the water?.....464, 2791, 3198
Mention the leading games that are played in the American schools and colleges, 176, 242, 1028, 3186
What would you say are the principal benefits to be derived from physical exercises?....176, 1352
Where were the Isthmian, the Pythian, and the Nemean games played?.....1418, 1920, 2341
Explain the difference between the skee and the skate 2645, 2666
Give an outline of how cricket and croquet are played 704, 712
Draw a checker-board and a chessboard, showing the position of the men at the beginning of the games 544, 549
What is the war game and where did it originate?..... 3082
In what country did lacrosse first become popular and how is it played?..... 1529

GEOGRAPHY

DEFINITION: Geography is the science which treats of the earth and its inhabitants.

Into what four branches or departments is geography divided? 1113
Define geographical distribution, 1111; what are some of the barriers against wide diffusion? 1112
Name some noted geographers.....1113, 1759, 2755
To what islands is the name Antilles applied?.....113, 3126
Where is the city of Archangel?.....131. 848
When was Australia discovered? By whom?..... 190
Is Abyssinia an elevated country? Bound it.....10, 31
Where and how large is Iceland? What is the principal tree found there?..... 1358
To what kingdom do the Azores belong?..... 200
Of what country is Algeria a colonial possession?..... 67
Describe the Appalachian Mountains.....119, 1987
Which is the largest sea in the world?..... 498
Why is the Dead Sea remarkable?.....764, 2084
What countries surround Afghanistan?..... 28
Name the principal islands of the West Indies..... 3126
State how many islands there are in Lake Huron. Which is the largest?..... 1343
What river drains the northern part of Arabia?.....125, 945
Where is the Arctic Ocean? 135; the Antarctic?..... 110
In what country is Mount Ararat?.....127, 147
How many islands are in the Bahama group?..... 210
Name the principal cities of France. 1047; Of Sweden 2787
What four capes are the extreme points of Africa? 29
Name the capital and largest city of Greece. 1193; Of India..... 1377
Is the Atlantic more stormy than the Pacific Ocean? 179
Name and define the five zones. What is their extent in degrees?.....856, 3224
What European country ranks second in size?..... 193

Is Bolivia larger than Chile?....327, 559
Where are the Caroline Islands, and to what country do they belong?.... 488
In what country is Yokohama? On what island?.... 3207
Describe the surface and products of Siberia.... 2625
Speak of the climate and resources of Nicaragua.... 1969
What countries have possessions in New Guinea?.... 1940
Outline the boundary of the Pacific Ocean. What is its area?.... 2076
How high do the tides rise in Passamaquoddy Bay? 2119
What and where is New Zealand? Describe the surface 1965
Name the chief productions and the leading cities of Norway 1998, 1999
What are the area, productions, government, and population of Paraguay?....2102, 2103
What and where is Poland? Outline its divisions 2247
Name the principal divisions and islands of Polynesia 2264
What is the area of Prussia? Name its chief rivers 2325
What country is the lowest in Europe?.... 1925
Name the departments of Porto Rico and give their population.... 2284
Describe the surface of Persia and speak of its chief industries.... 2163
Name the twelve principal islands of the Philippines 2187
Describe the surface, boundary, and rivers of Portugal 2285
Compare the length of 24 large rivers of the world 2425
Locate and describe Nova Scotia. To what country does it belong?.... 2001
Give the area, wild animals, and productions of Peru 2168, 2169
Speak of the rainfall in North America. Are the Pacific highlands arid?....1987, 2369
Locate the Rocky Mountains and name their principal peaks....452, 2433
Name the principal rivers, lakes, cities, and seas of Russia.... 2467
What are the right bank, the source, the mouth, and the basin of a river?.... 2425
Locate and describe Rhodes. To what country does it belong?.... 2409
Describe the city of Rome. Of what country is it the capital?.... 2440
How much of Europe is included in Russia and how much of Asia?.... 2466
Which is the most northwesterly republic of Central America? Name its capital....521, 1317
Name and locate the capital of Austria-Hungary....194, 3046
Describe the Sudan. Give its boundaries....33, 2767
Where are the Carpathian Mountains? Describe them 193, 488
What is the length of Chile? State the area and population 553, 560
Name the chief products of China and Japan....564, 1439
What and where is the Crimea? Speak of the Crimean War 705
State the causes of oceanic currents and mention their utility.... 728
What sea is east of Egypt? What sea is north of that country?.... 882
Into how many divisions did Cuvier classify the races of mankind?.... 941
Where is Greenland? To which country does it belong? 782, 1199
What and where is Ceylon? Of what country is it a colony?.... 525
Name and locate the capital of Norway.... 574
What are the leading industries of Cuba?.... 720
What and where is the English Channel? How wide is it?.... 923
Bound Spain. What is its form of government?....2694, 2695
How many cities of Germany have a population of over 200,000?.... 1128
Name the products of Turkestan; of Turkey....2939, 2941
Define spring tides and neap tides.... 2876
Explain the cause of the change of seasons.... 2575
Locate and describe the Cascade Mountains....376, 496
What and where is Cyprus? Describe the surface.... 736
To what country does Finland belong?....1000, 2466
In what regions are active volcanoes?....3039, 3061
Where is Tunis? To what country does it belong? 1047, 2934
Of what country is Syria a political division? Since when? 2801
What is the temperature of the sea? Why does it not freeze solid?.... 2571
What and where is Saxony? Give the capital....828, 2542
Bound Manitoba. What are the area and products? 1695
Describe the surface and coast of Madagascar. Name the capital....1668, 1669
Enumerate the natural resources of Mexico; the manufactures 1773, 1774
Describe the Danube. Is it important in commerce? Why? 752
Locate and describe the city of Venice.... 3029
What and where is Tasmania? Name its principal rivers 2822
Where is Lake Tsad and what rivers flow into it?.... 2929
What mountains traverse Servia? How high are they? 2592
Why is the freezing point of sea water lower than that of fresh water?.... 2572
Describe the surface of Scotland and speak of its lakes 2561, 2562
What is the area of the Hawaiian Islands? Which is the largest?.... 1265
Where are the Himalaya Mountains? Name the highest peak.... 1302
What is the general elevation of Louisiana?.... 1634
Explain the cause of day and night; of summer and winter 762, 2575
Bound Tripoli and name its chief cities.... 2931
Bound Venezuela. What is its form of government? 3027, 3028

To what country does Senegambia belong? 2586
Describe Sardinia. What kind of climate has it? 2529
What two republics are supported on the island of Hayti? 1271, 2516
Where are natural gas-producing regions? 1101, 1904
How many degrees from the poles is the Equator? 772, 929
Name the principal wild animals of Africa 32
Which is the largest and most populous continent? 162
Is Baikal a fresh-water lake? Where is it located? 211, 2625
Name and bound the largest country of South America 361
Locate the Sargosso Sea 728, 1218
How long is the Atlantic shore line of the United States? 2963
State the principal products of Switzerland 2794
Bound Honduras and describe its surface and natural resources 1317
How are longitude and latitude measured? 772, 1626
What form of government has Belgium? 168
Name all the countries of South America 2684
What can you say of the colonial possessions of Great Britain? 1189
In what regions are important walrus fisheries? 3077
What and where is Ballarat? For what is it noted? 216, 3045
Draw a map of the delta of the Nile; of Saskatchewan 778, 2533
Name the principal rivers of Germany 1125
Describe the contour and boundary of Greece 1191
What and where is Wales? Name the chief city 3071, 3072
Where is Bohemia? To what country does it belong? 323
Which is considered the largest island in the world? 341
Where is Denmark? Name and locate the capital 781, 668
Name and bound the smallest country of South America 3003
What and where is Sicily? To what country does it belong? 2627
Describe the surface and climate of the Sahara Desert 2486, 2487
Of what country is Hungary a part? What is the capital? 193, 194, 1338
Name the largest cities of Italy and locate them 1421
Name the two motions of the earth and explain the cause 856
What and where is the Zuyder Zee? 1925, 3227
Describe Ireland and give its area and population 1405, 1406
Where is Java? To what country does it belong? 1444
Name and locate a holy city of the Moslems 745
What is the area of Central America? 520
Name the chief cities of European Turkey; of Asiatic Turkey 2943
How is Iceland governed? What and where is the capital? 1358
Of what country is India a dependency? 1373
Name the three principal islands of Japan in the order of size 1438
How far from the Dead Sea is Jerusalem? 1451
Give the four extreme points of Europe 946
Describe the Gulf Stream. Is it important to commerce? 1217
Where are the Straits Settlements? To what country do they belong? 2755
What is the polar axis of the earth? How long is it? 856
Name the most important rivers of England and tell where they discharge 917

GEOGRAPHY OF BRITISH AMERICA

DEFINITION: The geography of British America treats of the natural aspects, resources, institutions, and people of Canada and Newfoundland.

Where is Prince Edward Island? Who discovered it? 2310, 2311
Do Newfoundland and all of Labrador belong to the Dominion of Canada? 1526, 1937
Draw an outline map of British Columbia, giving the principal rivers and cities 377
Which is farther north, Montreal or Victoria? Which has the warmer climate? (See map of Canada.)
Compare British Columbia with Quebec in size, in population, and in products 376, 377, 2348
What can you say of the surface, boundaries, and mineral wealth of Yukon? 3213
Name and locate the most important canals of Canada 2417, 2537, 3119
What important cities would you pass in sailing from the Gulf of Saint Lawrence to Port Arthur, Ontario? (See map of Canada.)
How many of the Great Lakes border on Ontario? What bay on the north? 2037
Which is larger, Alberta or Saskatchewan? Compare them in surface and natural resources 53, 2532
Describe the Fraser, the Nelson, and the Mackenzie 1057, 1919, 1663
What are the leading manufactures of Canada? Are they exported? 454
Locate and describe Winnipeg. Is it an industrial center? 3163
How do the Chinook winds affect the climate of Alberta? 54
Describe the Rocky Mountains in the Dominion. Which peak is the highest? 454
Name all the provinces and locate their capitals 455
Is lumbering an important industry? Is mining? Is fishing? 453, 1006

What island is a part of British Columbia? How is it separated from the mainland?..... 3016
Through what cities would you pass in riding by railway from Halifax to Vancouver? (See map of Canada.)
Name the principal lakes of Manitoba and Saskatchewan 1693, 2532
Why is the Saint Lawrence a great waterway? What large cities are located on its banks?.. 2494
Compare New Brunswick with Nova Scotia in mineral and agricultural wealth.....1934, 2002
What are the leading products of Newfoundland? Of Prince Edward Island?.....1938, 2311
What river forms a part of the boundary between Quebec and Ontario? Between Ontario and Keewatin? 2038
Name and describe the principal islands of Franklin and of the Gulf of Saint Lawrence..1055, 2494
What can you say of the surface of Ontario? Of the products?..... 2038
Name the capitals and the principal cities of Ontario and Quebec.....2039, 2350
Which has the warmer climate, Newfoundland or British Columbia? Which extends farther north? (See map of Canada.)
How is Ontario separated from New York? From Pennsylvania? From Michigan?...2037, 2489
What city is the greatest grain market of Great Britain? Why?..... 3164
In what regions of Canada are wheat, oats, and hay produced most extensively?.....453, 454
Where is Great Slave Lake? Athabaska Lake?.....1663, 2532
Can you sail by boat from Halifax to Port Arthur? On what waters? (See map of Canada.)
Where is Ungava? Give a description of the surface and climate.....455, 2959
What bay separates Ungava from Keewatin? What strait separates it from Franklin? 2959 (See map of Canada.)
Where are the principal forests of Canada? The chief fisheries?.....377, 453
Locate Ottawa and name its principal railways and leading buildings..... 2064
How many members has each province in the House of Commons? In the Senate?..... 455
What is the total population of Canada? The Indian and the Japanese and Chinese population? 455
Has the wealth of the nation increased rapidly the past decade? Has the population increased? 455, 458
What are the leading minerals?.....453, 1934, 2038
Name at least ten forest trees of the Dominion.....377, 453, 2349

UNITED STATES GEOGRAPHY

DEFINITION: The geography of the United States is a treatment of the geographical phenomena of the United States and its colonies.

Which is the most northerly State? The most southerly? 1799, 1016
Where is Albemarle Sound? Chesapeake Bay?..... 2963
Name the principal river of Arizona. Of Washington 142, 3093
Where is the Gate City? On what river?..... 1502
Bound the United States and give the area in square miles 2963
Name the principal cities of Arkansas and of Florida 145, 1018
In which State is the geographical center of the United States?..... 1488
When was Washington admitted as a State? Oklahoma? 2978
Name the principal rivers of Illinois. Of New York 1365, 1956
What minerals are obtained in Kentucky? In Minnesota? 1501, 1800
In what State and on what river is Omaha? Saint Paul? 1802, 1914
Name fine cities in Ohio and five in Wisconsin..... ....2024, 3169
Describe the boundary and surface of Colorado. Of Utah.....630, 3004
Compare Washington with Oregon as to size, climate, and products.....2049, 3093
How many physical divisions are there in the United States? 2978
Describe the Alabama River; the Ohio River.....47, 2022
Name the principal cotton-producing states.....687, 2972
Which State is the largest and which is the smallest in size?..... 2978
Describe and draw an outline map of Delaware..... 774
Compare Wyoming with Montana in respect to size and products.....1833, 3191
Describe the surface, contour, and products of Alaska 49
In what city is the "Cradle of Liberty?".....344, 975
Give a list of the colonies of the United States.....1265, 2187, 2984
On what river and in what states are Philadelphia and Trenton?..... 2181
Name and locate the capitals of all the states..... 2978
Describe the surface and enumerate the leading products of Texas.....2851, 2852
Between what two rivers is Iowa located and which is the largest river within the State? 787, 1401
Name the principal minerals of the United States and state where they are found..... 2970
Which is the largest city of Maryland? What and where is the capital?..... 1723
Name all the states in the Union in the order of size 2978
What does the name Iowa mean? What is the popular name of Indiana?.....1403, 1378
How many times larger is California than Delaware? 2978; than Kentucky?..... 2978
Name the principal cities of Minnesota and of New York 1802, 1958
What are the capitals and largest cities of Colorado and Massachusetts?.....631, 1729
Is the surface of Colorado elevated? Is it level or mountainous?..... 630
Name the principal corn-growing states and the leading tobacco-producing states.....678, 2888

Where is Vicksburg? When was it the scene of a siege? ... 3042
Compare Virginia with West Virginia as to size and population ... 2978
In what section of the country is the State of Mississippi? ... 1808
Name the chief cities of Nebraska; of Tennessee ... 1914, 2844
Where are the principal forests and the most extensive plains? ... 1031, 2230
Describe the Connecticut River and the Columbia River ... 634, 657
Name and locate the largest and most important canals ... 458, 459
How long is the northern boundary of Missouri? What is the length of the State from north to south? ... 1810
What mountains are found in New York? In Missouri? ... 1811, 1956
Which State is divided into two peninsulas? By what lake? ... 1778, 1780
Describe the coast and name the principal rivers of Maine ... 1678, 1679
Name the leading cities of Ohio, Oregon, and North Dakota ... 1994, 2051, 2024
What trees grow in North Carolina? In Louisiana? ... 1635, 1990
Compare the products of South Dakota with those of Idaho ... 1361, 1993
Which State has the smallest population? Which has the largest? ... 2978
How many miles long is Pennsylvania? Nebraska? ... 1912, 2149
Locate and describe the Ozark Mountains. What minerals do they contain? ... 2074
Bound Rhode Island and name its largest cities and principal rivers ... 2407, 2409
Compare Ohio with Alabama in size and products ... 45, 46, 2022, 2023
Bound Pennsylvania and name the leading products of the State ... 2149, 2150
Locate New York City and give an account of its principal public improvements ... 1959, 1961
Describe the Rio Grande. Is it important in navigation? ... 2423
From what country does it separate Texas? ... 1773, 1987
Name and locate the twenty largest cities of the United States in the order of size ... 2974
Is the Hudson important to commerce? Why? ... 1332
Where is the Natural Bridge? What are the Palisades of the Hudson? ... 1904, 1957
How many representatives are sent from New York to Congress? From Illinois? ... 2976, 2978
Name the principal cities which you would pass in sailing by boat from New Orleans to Saint Paul. (See map of the United States.)
Which is farther north, Boston, Mass., or Seattle, Wash.? (See map of the United States.)
Why is Chicago a great city? San Francisco? Duluth? ... 552, 840, 2518
Is Tampa, Fla., as far or farther south than San Antonio, Texas? (See may of the United States.)
Which is the Empire State? 1956; the Lone Star State? 2850; the Hawkeye State? 1400; the Buckeye State? 2022; the Flickertail State, 1992; the Bluegrass State? ... 1500
Where is the principal section of the corn belt? 678; the wool-growing regions? 3181; the spring and winter wheat belts? 3133; the fruit-growing sections? ... 1075, 1326
In sailing from New York City to Duluth, Minn., through what bodies of water would you pass? (See map of the United States.)
Which is farther west, New Orleans or Minneapolis? (See map of the United States.)
Write the abbreviations of Maryland, Ohio, California, Oregon, Maine, Virginia, Tennessee, Rhode Island ... 4
Is the Missouri River important as a commercial highway? Why? ... 1810
Is the percentage of growth in population increasing or decreasing? ... 2276, 2975
Compare the present population of the country with what is was in 1800 ... 2975
How large is the Negro, Indian, Chinese, and Japanese population of the United States? ... 2974

HISTORICAL SAYINGS

DEFINITION: Historical sayings are clear and concise declarations, or statements, which have come down to us through the history of art and science.

What eminent Roman said, "I came, I saw, I conquered?" ... 430
Who said "I carry all my goods (riches) with me?" ... 287
Of whom was it said "He smote the rock of national resources and abundant streams of revenue burst forth?" ... 85
What does the expression "Crossing the Rubicon" mean? ... 2459
Who was known as the "Great Reconciler?" ... 87
What American was called the "Little Giant?" ... 820
Who is frequently called "The Last of the Barons?" ... 3088
Who said that his throne should descend "To the worthiest?" ... 62
Who would "rather have lost £10,000 than her tutor Ascham?" ... 160
What American said, "One to-day is worth two to-morrows?" ... 85
Who was the "Hero of Tippecanoe?" ... 1259
Who was called "Marshal Forwards?" ... 317
What American said, "Give me liberty or give me death?" ... 1288
What eminent divine closed a plea with the words, "There I take my stand; I can do no otherwise; so help me God?" ... 1647
By whom and of whom was it said, "To the victor belongs the spoils?" ... 1429
Who said, "All we ask is to be let alone?" ... 760
Whose dying words were, "Don't give up the ship?" ... 1553
Who was called the "Good Queen?" ... 1633

Who said, "We have met the enemy and they are ours?" 2162
What are the "Madison Papers?" 1670
Whose sermons were said to be "born not on his lips but in his soul?" 1647
What Roman woman said of her sons, "These are my jewels?" 679, 1174
Who was required by oaths to abjure the truths he had discovered and afterward exclaimed, "But nevertheless it does move?" 1087
What did Lincoln say about slavery in 1862? 908
What flag bore the motto, "Don't tread on me?" 1009
Who said, "I have just given to England a maritime rival that will, sooner or later, humble her pride?" 1637
What was the inscription on the tomb of Euripides? 946
Who is known as the "Wizard of Menlo Park?" 871
What did Addison say of the ducking stool? 837
Who was called "the Plumed Knight?" 308
What did Plato say of Socrates? 2670
Who was "Rough and Ready?" 2829
What expression did Gen. John Stark make at the Battle of Bennington? 2727
Who was called "Watch-dog of the Treasury?" 3089
What is Black Friday? 305
Who was said to have been "everything for others, nothing for himself?" 2171
What American said, "We have lived long, but this is the noblest work of our whole lives?" 1637
Who is known as "the schoolmaster president?" 1097
Who was called "the sweet singer of Israel?" 759
What statesman was known as the King Maker? 3088
Who originated the term, "First in war, first in peace, and first in the hearts of his countrymen?" 3096
When was "The era of good feeling?" 1831
On whose tombstone is the couplet naming four continents? 3200
Which is "the book of books?" 287
Who exclaimed, "Eureka! Eureka!" on making a discovery? 131
Who said, "The people want to be humbugged?" 234
From what circumstance arose the proverb, "To shun Charybdis and fall into Scylla?" 2570
What statement was imputed to Chief Justice Taney? 2814
Of whom was it said that she "was busy from morning till night providing comforts for the sick soldiers?" 3097
How did the word Yankee originate? 3201
What is meant by kissing the blarney stone? 310
Give a familiar quotation from John Trumbull 85
Of whom was it said, "There is but one wit in England?" 1846
Who said, "I propose to fight it out on this line if it takes all summer?" When? 1180
When was the expression "government by injunction" originated? 767
Who was known as the "Iron Chancellor?" 301
Who originated the proverb, "Procrastination is the thief of time?" 3210
Whence came the saying, "The cat in gloves catches no mice?" 85
Of whom was it said that he did the "most daring act of the age?" 768
How did T. J. Jackson come to be called "Stonewall?" 1430
What inscription is on the monument of Ben Jonson? 1470
Who was called "Light Horse Harry?" 1560
What was called a "cheese box on a raft?" 932
Who is the "Hero of Manila?" 792
What exclamation did Caesar make at the time of his assassination? 430
What is implied by the saying, to "cut the gordian knot?" 1165
What was the riddle of Sphinx solved by Oedipus? 2020
Who were the seven wise men, and what are their characteristic sayings? 2595
What did Admiral Dewey say of W. S. Schley at Santiago? 2551
Who was called "Mad Anthony Wayne?" Why? 3109

HISTORY OF EDUCATION

DEFINITION: The history of education is the history of the principles, methods, and institutions by means of which mankind has been educated, from the earliest period of historic times to the present day.

What is the threefold aim of education? 872
Define pedagogy and write an essay on the subject 2135
What do you understand is meant by the *culture epoch theory?* 2138
Who is regarded the most eminent philosopher of ancient Greece? 140
What can you say of the state of education in Assyria? 171
Speak of the culture and literature of Babylonia 204
What can be said of the British Museum as a means of diffusing learning? 378
Speak of the influence of the Byzantine Empire upon learning during the Middle Ages 423
What influence did Caesar exercise upon the improvement and education of Rome? 430
What is a catechism and when was the first book of this kind published? 505

Explain the Delsarte system and tell who originated it 778
Is education creative in its nature? If not, what is its aim?..... 872
What Greek teacher is said to have adhered "to essential naked truth?"..... 141
When and where were the first colleges organized? 624
Name some of the leading educators of the United States and of Europe..... 875
What celebrated institution of learning was founded by Francke?..... 1053
Where were the most noted *gymnasia* of Greece and for what purpose were they maintained?
What are the *gymnasia* of Germany? 1224
Discuss the more prominent views of education promulgated by Herbart..... 1290
What is calisthenics and in what institutions has it been adopted?..... 441
Speak of education in Greece and Rome and compare the systems of those countries..... 874
When and where did Froebel establish his kindergarten? 1073
What was the Inquisition? Speak of the punishments inflicted by it in Europe..... 1391
Is a library important in the advancement of education? If so, why?..... 1582
What is a normal school and where were institutions of this class first established?..... 1984
What are the aims of the teachers' institute?..... 2830
What country has been called the land of pedagogy and why?..... 874
Define empiricism. When is teaching said to be empirical? 913
What characteristic saying can you quote regarding Mark Hopkins?..... 1321
What noted work on teaching was written to John Locke? 1614
Give an outline of the views on education advanced by Rousseau 2456
What can you say of the system of public education in Denmark? 782
Give a synopsis of the teachings of Immanuel Kant 1492
What cities, both ancient and modern, are associated with great libraries?..... 1583
Give an account of the life and work of Pestalozzi..... 2171
At what period in European history did scholasticism have its rise?..... 2552
Give the benefits of the kindergarten in the training of children..... 1508
Give a general outline of the schools maintained in the United States..... 2554
What countries of America take high rank educationally? 875
Name and define the five divisions of science..... 2559
What is the chief aim of schools of correspondence? 2555
Did the Reformation have a widespread and lasting influence upon public thought?..... 2389
What remarkable proposition was advanced by the scholastics? 2553
What objects are employed with greatest success in the kindergarten?..... 1508
Did the Babylonians and ancient Hebrews maintain schools? 2553
What must a student of science consider of prime importance? 2559
Give a list of the principal universities of the world 2997
Give a list of the schools recognized by the leading nations 872
By whom were the first public and free schools established in America?..... 2554
What effect did the rise of education have upon serfdom in Europe?..... 2590
Speak of the Jesuits as factors in educational thought 1452
Name some of the eminent Romans who exerted an influence upon education..... 2445
What can you say of the influence of Savonarola upon Italy?..... 2539
Name some of the eminent teachers of Western Europe 2554
What is a university and when were the modern universities of Europe founded?..... 2996
What can you say of the influence upon education exercised by Christ?..... 874
Who was the founder of the Greek school of philosophy? 2234
Is there a limit to the field of study and investigation? 2559
In what portion of the United States is the lowest per cent. of illiteracy?..... 2555
What is university extension and why is it beneficial? 2998
Quote what Plato said in his "Phaedo" regarding Socrates 2670
Give an outline of the teachings of Plato..... 2235
When and where was the first public library founded? 1582
What is the aim of a university education and what degrees are conferred upon those who complete the courses?..... 772, 873

INVENTIONS

DEFINITION: An invention is an original contrivance or construction and is intended to promote industry or add to the sum of human happiness.

Who are the inventors of the most serviceable flying machines? 1024, 3187
When and by whom was the first eminently successful dirigible balloon made?..... 217, 3219
Who invented the first high-pressure steam engine used in America?..... 952, 2366
What are steam plows? Where are they used?..... 2239
Who invented the type-setting machine usually called the linotype?..... 1599, 1761, 2952
When and where was the first watch made?..... 3099
When, where, and by whom was the first powerful microscope made?..... 1782
What inventor greatly improved locks and safes?..... 3200
Who invented the Gunter's chain? How long is it? 1221
When and by whom was printing invented?..... 686, 1223
When did friction matches come into general use?..... 1733
What invention made the name of Fairbanks famous? 968

Explain the utility of passenger elevators..... 900
Who invented the Drummond light?..... 834
What is a dial? Where was the first dial of which we have any record?..... 793
Who invented the safety lamp?..... 762
Where are the freezing and boiling points of water on the Fahrenheit thermometer?..... 967
Why is a diving bell so called?..... 805
What is a Crookes tube? For what is it used?..... 711
What is a vestibule train? Who designed it?.....2333, 2367
When and by whom was the *Monitor* constructed?.....932, 1827
What is a double-track railroad?..... 2367
What was the *Great Eastern?* When and where was it constructed?..... 1190
When and where were steel needles first manufactured?..... 1917
What is a flying machine?..... 1023
What are flint implements?..... 1014
When was gunpowder invented?..... 1221
When were lead pencils first made?..... 2146
What is the Gatling gun? When was it adopted by the United States?..... 1103
When and by whom was the lightning rod invented?..... 1056
By whom was the Ferris wheel designed?..... 990
When and by whom was the first needle gun made?..... 831
By whom was the mule-jenny invented?..... 710
Where is one of the most remarkable clocks?..... 606
Who invented the self-intensifying process of making liquid air?..... 2920
Who were the first successful manufacturers of fireworks?..... 1004
Why is a spirally grooved rifle the most valuable?..... 2420
What is a talking doll?..... 812
In what year were shells invented? When did they come into general use?..... 2610
Who invented the Corliss steam engine?..... 677
When were cannon first used in Europe?..... 463
When and where were breech-loading guns first used successfully?..... 367
Are artificial limbs of modern invention? Of what are they made?..... 158
What is papier-maché? Name some articles made of it..... 2099
Who invented the first modern system of shorthand?..... 2620
What two men are credited with the invention of movable type?..... 2313
Where was the first steam railway built in the United States?.....2355, 2366
When were the first sleeping cars made?..... 2367
What invention made the name of Elias Howe famous?..... 2599
Who invented the chain-stitch sewing machine? Why is it not practical?..... 2599
For what are slot machines used?..... 2654
Who built the steel-arched bridge across the Mississippi at Saint Louis?..... 852
Who invented the Colt revolver?..... 633
What are cable cars? Where are they still used extensively?..... 426
Who is noted for making marked improvements in the manufacture of steel pens?..... 2145
Who made the first rapid printing press?..... 2314
When did the automobile come into use?..... 196
When and by whom was dynamite first made?.....849, 1981
Who originated the block system of signals?..... 314
What is the Archimedes screw? For what is it used?..... 132
Who first made delft pottery ware?..... 2295
What is a quern? Where are they still used?..... 2353
Who patented the first revolver?..... 2404
When and by whom was the saxhorn invented?..... 2542
When was the first patent on a fireproof safe issued?..... 2483
Who invented the Réaumer thermometer?..... 2383
Who invented the cotton gin?..... 3143
What is a speaking trumpet? Who invented the modern speaking trumpet?..... 2701
Describe a broadcast seeder..... 2693
When were postage stamps generally adopted in the United States?..... 2722
Who made the first steamboat?.....1078, 1610, 2732
When was the first modern steam engine made?.....2734, 3105
What is a locomotive?..... 2735
Who invented the steam hammer? For what is it used?..... 2735
What is a snowplow?..... 2666
When and where was the first type-setting machine patented?..... 2952
In what countries are snowshoes worn?..... 2666
When and by whom was built the locomotive called "My Lord?"..... 2740
How does the telescope assist the eye?..... 2838
Where is the largest telescope in the world?..... 2839
Name some of the men who aided in improving the telescope?..... 2839
Who invented the rotary-field motor?..... 2849
What is a thermometer? Name the three principal thermometers..... 2861
How can degrees indicated by one thermometer be reduced to those of another?..... 2861

What inventions were made by Elihu Thomson?..... 2867
What three men made the first practical typewriter? What is it called?..... 2952
Who invented an electrical fuse useful in the pneumatic dynamite gun?..... 3215
How are safety matches made? When and where were they first made?..... 1734
When and by whom was nitroglycerin discovered? 1980

LITERATURE

DEFINITION: Literature is the entire body of writings which embraces the results of knowledge and fancy.

What are the title page, the preface, the table of contents, and the text of a book?..... 335
How were the writings of the ancient Egyptians and Babylonians preserved?..... 335
What is bookbinding? What are *full, half,* and *quarter* bound books?..... 336
What is "Literature in the higher sense?" Define poetry and oratory..... 1602
Explain the meaning of lyric poetry and give an example 1652
Give a list of the biographies treated in Plutarch's "Parallel Lives or Illustrious Greeks and Romans" 2241
Distinguish between prose and poetry. What is an essay? 937, 2320
Mention at least ten prominent writers of Canada. Who wrote "Lawrie Todd?"..... 456
What is the book of the dead?..... 883
Who wrote "Poor Richard's Almanac?".....85, 1056
Name some of the writings of William Cullen Bryant 86, 391
Who was the god of love? Of war?.....725, 1714
Name six English historians and six poets.....919, 920
Name some of the writings of Goethe. Of Schiller 1158, 2549
Who wrote "Battle Hymn of the Republic?"..... 1329
Who were the great writers of the Elizabethan period? 919
What is the "Edda?" The "Sagas?".....868, 2484
What are the chief writings of Longfellow? Of Holmes? 87, 1313, 1625
Who wrote "The Raven?" Who wrote "Hail Columbia?" 86, 1321, 2244
What are the chief writings of Thomas Paine? Of Whittier? 2080, 3144
Who were the leading antislavery orators?.....88, 1099, 2193
Give the nom de plume of ten American writers..... 2327
Who are the leading writers of American history?.....88, 223, 2305
Mention a number of current American writers.....21, 901, 2421, 2447
When and what was the first book printed in America? 84
Which Queen of England was a contemporary of Shakespeare? 919, 2603
By whom were *Ivanhoe, Faust,* and *Macbeth* made famous? 981, 1656, 2566
Who wrote "Adam Bede," "Les Misérables," and "Westward Ho?" 902, 1333, 1510
What is a novel? Who wrote "Vanity Fair?".....2003, 2854
Who were the Meistersingers, the Minnesingers, the Troubadours? 1732, 1799, 2924
What are the national hymns of Great Britain, Germany, France, and the United States?.. 1903
Name the leading poets and prose writers of ancient Greece and Rome.....1194, 2445
Define epic, hymn, ode, oration, romance.....926, 1353, 2018, 2047, 2438
Who wrote the legend of *Rip Van Winkle* and who wrote "The History of Pendennis?" 2424, 2854
Give an explanation of ballet, burlesque, drama, masque, and theater.....216, 409, 825, 1726, 2855
Who wrote "The Adventures of Sherlock Holmes" and "The Green Flag?"..... 822
Why is Hans Christian Andersen famous?..... 97
Name what you consider the six best selections from Shakespeare. Speak of the works of Thomas Gray and Charles Dickens.....795, 1185

MENTAL SCIENCE

DEFINITION: Mental science, or psychology, is the science which treats of the attributes and operations of the human soul.

Define pedagogy. Is good teaching based upon a knowledge of psychology?..... 2135
What are methodology, self-externalization, and educational economy? 2137, 2138
Give an outline of how the will and the memory may be trained.....1793, 2328
From what do pleasurable dreams result?..... 828
Explain the meaning of intuition and instinct.....1394, 1399
Is psychology an inductive study? Give a reason for your answer..... 2327
What is abstraction? Define association.....9, 170
What does the process of acquiring knowledge involve? 2328
Explain the meaning of apperception and conception 120, 645
Who regarded history the most potent study in developing child nature?..... 1290
What causes laughter? Why is it sometimes accompanied by tears?..... 1548
What is an idea? A primary idea?.....1363, 1399
Can the will be trained? If so how?..... 3150
Which did Kant consider the three original faculties by which we acquire knowledge?.... 1492
By what influences is the imagination governed chiefly? 1369
Into what three classes are the powers of the mind divided? 1793

Who wrote "Inquiry into the Freedom of the Will?" 878
What is conscience? How can it be trained?..... 657
Define perception. Can it be cultivated?..... 2156
What philosopher believed that will is the only essential reality in the universe?..... 2556
Distinguish between soul and mind..... 2678
Do we possess freedom of the will?..... 3150
Tell how association aids in the acquirement of knowledge 170
Explain the doctrine of egoism. What is altruism? 78, 881
Of what can we be conscious?..... 658
What is a sensation? Name the organs of the senses 2588
Can the power of attention be cultivated? How?..... 181
What is the intellect? How can it be cultivated?.....1396, 2327
Do we know the constituents of mind or matter?..... 1793
Explain the theory of unconscious cerebration..... 523
What is correlation? How can it be utilized in studying? 682
State the difference between the inductive and deductive methods of reasoning.....770, 1385
Enumerate the representative and reflective powers of the mind..... 2328
Who first employed the term concentration in the study of mind?..... 645
Is there a close relationship between the body and mind? 1793, 2328
Define memory. Can it be trained? If so, how?..... 2328
Define consciousness. Of what can we be conscious? 658
What is the cause of different kinds of dreams?..... 828
Is a faculty of the mind under the control of the will? 967
Define feeling. How are the feelings classified?..... 984
In what way does the imagination lighten the burdens of life?..... 1369
What ideas are the product of intuition?.....1363, 1399
Can the reason exercise itself on abstract as well as simple subjects?..... 2382
What is fancy? At what time is the power of fancy greatest? 975
Distinguish between psychical and corporeal feelings 984, 2328
Define attention, habit, imagination, and judgment.....181, 1228, 1369, 1476

MINERALOGY

DEFINITION: Mineralogy is the science which treats of minerals and enables us to describe and classify them.

Name the principal departments into which mineralogy is divided or classified..... 1794
What is brass? Mention its principal uses..... 361
How is potash obtained and for what is it used?..... 2292
How is salt obtained? Which county produces the largest amount of salt?..... 2507
What is mineral wool and how is it obtained?..... 1795
Where are the largest natural gas fields? The largest nickel mines?.....1904, 1972
What is onyx? For what was it used by the ancients? 2040
What is plaster of Paris and why is it so named?..... 1225
What are the principal characteristics of metals? Name the more important metals..... 1766
What is alluvium? How much silt is carried annually by the Mississippi?..... 74
What is asphalt and where was it first found? Tell of its principal uses..... 167
Name and describe a mineral highly useful for its property of not being affected by fire. For what is it used?..... 159
Where is cadmium found and when was it discovered? 428
Name the three forms of carbon. Which is the purest form? 479
Of what is chalk composed? Is chalk still forming? 527
State the constituents of coal and tell how coal was formed 609
What country is the largest producer of copper and what are the uses of that metal?..... 670
Of what substances is felspar the principal constituent? Where is it mined?..... 985
What is alum? How is it obtained and for what is it used?..... 78
Is bitumen of vegetable origin? Where is it found and for what is it used?..... 303
To what class of minerals does carnelian belong? For what is it used?..... 486
How is clay formed? Where is fire clay found?..... 596
Name the three kinds of coal marketed most extensively and state the constituents of each. In what sections of the country is lignite coal used extensively? 609
Is copper ductile and elastic? Is it a good conductor of heat and electricity?..... 669
What is flint? Speak of its color, its composition, and its uses..... 1014
Describe amber and tell of its value and principal uses 81
What are the characteristics of cobalt and where is it mined extensively?..... 611
What is loadstone? What did the ancients think of it? 1612
Name the principal mineral deposits of the Cascade Mountains 496
What is garnet? Name the different kinds of garnet and tell where they are found..... 1098
State some of the characteristics of gypsum and enumerate its principal uses..... 1225
What is an igneous rock? Is it stratified or unstratified? 1364
Was iron known to the ancients? What country produces the largest quantity of pig iron? With what other substances is it combined and why? 1410
Is isinglass a mineral? Where is it found and for what is it used?..... 1416

What is jet and what class of jewelry and ornaments is made of it? ... 1454
Is amethyst a precious stone? Where are the best specimens obtained? ... 89
What is calcium and for what purposes is it used? ... 434
Classify chalcedony. For what is it used principally? ... 526
What is the value of the fluor spar produced annually in America? ... 1022
Which is considered the most important of all the metals? Why? ... 1409
To what family of minerals does jasper belong? Name the different varieties of jasper ... 1444
Describe lead and tell in what state it is obtained principally ... 1554
What are the chief constituents of natural gas and for what is it used? ... 1904
Describe nickel and tell where it is found and for what it is used ... 1972
Describe phosphorus. Where is it found and for what is it useful? ... 2200
What is quartz and what metals are associated with it? ... 2346
Is salt a useful compound? What substances are derived from it? ... 2507
To what class of precious stones does sapphire belong? ... 2527
Of what is serpentine rock constituted? ... 2590
Classify and describe marble. Whence did ancient masters secure fine grades of marble? ... 1704
What are metamorphic rocks? Are they generally stratified? ... 1767
Describe obsidian and tell for what it was used by the early peoples of Peru and Mexico ... 2016
What is ochre? What are the leading ochre-producing countries of the world? ... 2016
What kind of opal is the most valuable? Where are opals of a fine quality found? What was the value of the opal owned by Nonius? ... 2041
Give a description of potassium. Is it a conductor of electricity? ... 2292
Is ruby a valuable stone? If so, how does its value compare with that of diamond? ... 2459
Why is shale so named? What does bituminous shale yield? ... 2603
Is meerschaum a mineral? Where is it found and for what is it used? ... 1750
What is pseudomorphism? Explain the process of petrifaction ... 1795
In what form does saltpeter crystallize? Mention its uses ... 2509
Why are selenium and tellurium important in electrical science? ... 2581
What are the specific gravity, density, and melting point of silver? ... 2637
Name the more important precious stones and give their uses ... 2750
At what temperature can zinc be drawn into wire? ... 3220
Is sulphur widely diffused in the mineral kingdom? ... 2773
Give the characteristics of tin and tell of its uses ... 2881
Is topaz a gem? What is false topaz? ... 2895
Describe tourmaline and speak of its properties ... 2904
What is trap and how is it formed? ... 2913
Is silver a good conductor of heat and electricity? ... 2637
How, when, and by whom was thallium discovered? ... 2854
Which is the hardest of the precious stones? ... 793
Is granite a stratified or an unstratified rock? Does it take a high polish? ... 1179
What country ranks first in the output of silver and which in the production of nickel? ... 453, 2038, 2638

MISCELLANEOUS

DEFINITION: A miscellany is a collection or assortment which contains subjects of various kinds.

What is an ensilage and how is it constructed? ... 924
When and for what purpose is Labor Day celebrated in Canada and the United States? ... 1526
What is the Bridewell? How is the name used at the present time? ... 370
Give the life history of trichinae. How do they enter the human system? ... 2918
What was the Star Chamber? Why was it abolished? ... 536, 2727
How does the Koran sum up the attributes of God? ... 70
Explain the meaning and uses of anagrams ... 94
What is an annuity? On what are life annuities based? ... 108
What is April Fools' Day and how did it originate? How is it observed? ... 122
Explain the meaning and uses of auscultation ... 187
What is blarneying and where is the blarney stone? ... 310
Name the most notable bridges of the world ... 371
In what relative proportion are the different letters used? ... 2951
Compare the acre used in the United States with a similar unit of measurement employed in other countries ... 16
What is anarchism and who is the originator of that theory of economics? ... 94
What is antitoxin and how is it obtained for use in medicine? ... 114
Explain the meaning of balance of power. How is the term used in Europe? ... 214
What is a Creole? Of what languages was the Creole dialect formed? ... 702
Define heredity. Is there a general tendency in plants and animals for the offspring to resemble the ancestral stock? ... 1292
Trace the Nicaragua Canal from the Caribbean Sea to the Pacific Ocean ... 1970
What was the X Y Z correspondence? ... 3197
Who is the founder of scientific archaeology? ... 3159
In what cities are famous bells? ... 268

What is the national game of Spain? In what parts of America is it popular? 402
Explain the meaning of higher criticism and state how it differs from lower criticism 706
Locate and trace the route of the Panama Canal 2093
What were the Sicilian Vespers and when did they take place? 2627
Where is Balmoral Castle? By whom was it built? 219
What is an antipope? How many were there? 114, 2273
Who may be termed a critic? What is higher criticism? 706, 707
What were the councils of Nice and for what purposes were they called? 1970
Name an American ex-President who made a hunting tour in Africa. Where did he land? 2447
What and where is The Border and for what is it noted? 340
Draw a map of the Antarctic region to show the routes taken by Shackleton and others while in search of the South Pole 2250

MUSIC

DEFINITION: The science and art of tones, or musical sounds, that is, sounds produced by uniform and synchronous vibrations.

What eminent singer is called "The Swedish Nightingale?" 1596
Describe the bagpipe, the banjo, the cornet, the harp, the pipe organ 210, 225, 680, 1255, 2052
What is the musical staff? What are staff degrees? 1880
Name ten celebrated musicians 1879
What is a guitar? How many strings has a modern guitar? 1217
Who is said to have made the first drum? 833
What is a choir? A chorus? 572, 573
What is a banjo? Who invented it? 225
What pianist donated $10,000 for the encouragement of American composers? 2078
What composer has never been excelled in the ease and dignity with which he wrote? 1865
How does a musician play on a dulcimer? 840
What is a partial organ? What are the stops? 2053
Who wrote "Home, Sweet Home?" 2129
What is a pianoforte? A pianola? 2208, 2209
What is a saxhorn? A saxophone? 2542
Who wrote "My Country, 'Tis of Thee?" 2659
Name an eminent American musician of the 20th century 2680
What is a tambourine? What peoples use the tambourine? 2812
Who wrote "Tannhäuser?" 3069
Name a famous violinist of the 19th century 401
What is a chord? A concordant? 573, 1880
What were the first pianofortes called? 2208
To what class of musical instruments does a flute belong? 1022
When and by whom was the first reed organ made? What was it called? 2053
What letter represents the sixth note in the diatonic scale of C major? 1
When were the finest violins made? 3052
What country is noted for its eminent musicians? 1879
What is an Aeolian harp? By whom was it invented? 26
Describe an accordion. Name two similar instruments 12
Who is noted as the most eminent composer? 262
What is a snare drum? A kettledrum? 833
How many registers does the human voice contain? 974
By what is pitch or relative height of tone determined? 1879
What noted musician wrote 633 musical compositions? 2556
What musician originated the method of piano tuning by which all the keys and all the fingers may be used? 205
Describe a flute. Has it been long in use? 1022
Who is mentioned in the Bible as the "father of all such as handle the harp and the organ? 873
What is the largest and most important of all musical instruments? 2052
What is an oratorio? When and by whom was a famous oratorio society established in America? 2047
Who is noted as the greatest maker of violins? 2755, 3052

NATURAL WONDERS

DEFINITION: We may classify the larger and more impressive phenomena of nature among the natural wonders of the universe.

To what class of birds does the laughing jackass belong and where is it found? 1510
Which is the largest living bird and what is its principal means of safety? 2062
Why is it difficult to distinguish between some animals and some plants? 104, 2232
What is the traveler's tree? Why is it so called? 2913
What is the giant's causeway and where is it located? 1137
Where are remarkable caves? 513, 1688, 3190
What is a bore? How high is the bore of the Peticodiae River? 340
How many trunks has a large banyan tree? 227

What is a pitcher plant? How did Darwin class them? 2223
What is a rocking stone? Where is the most remarkable one found?..... 2432
How can a salmon move upward in falling water?..... 2506
Where is the Shoshone Falls?..... 2620
Where is the wonderful Tempe valley?..... 2839
What is a rattlesnake? Is it poisonous?..... 2377
About how long are the threads of a silkworm cocoon? 2637
By what are simooms caused and where do they occur? 2639
Why does the word *vibgyor* enable us to remember the order of the colors in the solar spectrum? 2703
Where is the geyser called "Old Faithful?" Why is it remarkable?..... 1135
What is twilight? How is it caused?..... 2948
Describe Fingal's cave and tell where it is located? 999
What is aurora borealis? When is it visible?..... 186
What are showers of fishes and how do you account for them?..... 2621
Do snowflakes have a variety of forms? What is the most common form?..... 2665
Mention some reasons why snow is important..... 2665
Which is the most wonderful natural park in the world? 3204
What causes glaciers? What is the largest glacier in the world?.....1145, 1146
Where is the Echo River?..... 1688
How does a spider spin its web? For what is it used? 2707
What is a trapdoor spider? 2708
Do plants grow in Spitzbergen?..... 2711
Are sponges animals or plants? What are the sponges of the market?..... 2713
What causes spontaneous combustion?..... 2713
Where is Inspiration Point? Describe Goat Island 1156, 1967, 3209
Do volcanoes ever emerge from the sea?..... 3061
Describe an intermittent spring. A thermal spring 2715
What was the Tarpeian Rock?..... 2820
Where are the highest tides?..... 2876
Why is the torpedo a wonderful fish?..... 2897
When were torpedoes first applied in warfare?..... 2898
What are the Chinook winds? Do they affect the climate of Alberta?.....54, 3160
Where is the Grand Geyser? The Old Faithful Geyser? 1135, 3205
Name one of the domes of Mammoth Cave. Where is the Echo River?..... 1688
What fish swims with the greatest swiftness?..... 2213
What valley rivals in beautiful scenery the Yellowstone National Park?..... 3209
Where is the New Geyser, or *Storkkur?*..... 1135
What volcanic eruption buried two cities?..... 3039
Which is the highest of the great waterfalls?..... 3101
Where is the Victoria Falls? What famous bridge is near it?..... 3046
What is a sea breeze? What is a land breeze?..... 3159
How many full moons would equal in brilliancy the light of the sun?..... 1843
Which is the largest glacier in the world?..... 1146
How many wasps live in a single nest?..... 3099
Where is Niagara Falls? Draw a map of the vicinity 1967, 3101
Which is the most noted cascade of the Mississippi valley? 3101
How long is a whale? Describe this animal..... 3131
What is a weeping willow? Of what is it symbolical? 3155
Give the reason why plants have a green color..... 2233
What is a whirlwind and by what is it caused?..... 3137

NATURE STUDY

DEFINITION: Nature study embraces the study of natural objects, such as animals, plants, minerals, and the various branches of natural science.

What birds can be taught to speak and imitate the human voice?.....1676, 2114
Name twenty species of common birds..... 298
What reptile often attains an age of 100 years?..... 2899
How is whalebone obtained and for what is it used? 3132
What animal sheds its horns every year?..... 771
Which is the largest carnivorous animal native to America? 1433
What birds lure intruders away from their nests by appearing to be lame?..... 1543
What insect is noted for its long leaps?..... 1012
Name an insectivorous mammal common to many parts of Africa..... 1
In what insect is honeydew found?..... 117
What are barnacles. By what people are they used as food?..... 232
How many queens has a swarm of bees?..... 258
What ape is quite manlike in form?..... 562
Upon what does the cobra de capello feed?..... 612
How can we best elude a crocodile on land?..... 708
At what temperature are the eggs of most birds incubated? 880

Name the parts of a flower 1020
What animals are said to "live on their tails?" 1073
What fishes show a phosphorescent light at night? 1448
In what respects does the goat differ from the sheep? 1155
Name the largest birds of song 1652
Which class of ants is the most intelligent and interesting? 109
Can baboons sit easily in an upright posture? 203
What animals build dams and houses? 256
For what is clover useful? 607
In what bird do the mandibles cross each other? 713
How many arms has a cuttlefish? 732
Name different kinds of foxes. Are they cunning animals? 1042
Does the ant-eater have teeth? 110
Give proofs that the bear is a cunning animal 253
How can a fly walk on the ceiling? 1023
Is the flesh of the badger eaten? 209
Do some animals propagate themselves by buds? 395
How many eggs are laid by a single butterfly? 506
Where is the cinnamon tree cultivated? 584
What product is valuable only in an immature state? 723
How can we distinguish an African from an Asiatic elephant? 898
What is a flying fish? A fiying squirrel? 1023, 1024
In what respects are toads different than frogs? 2886
Tell of the growth and development of the silkworm 2636
What is mother-of-pearl and for what is it used in manufacturing? 2133, 2134
What is an insectivorous plant? Describe the pitcher plant 2223, 2224
Name a poisonous snake that is mentioned in ancient history 166
What bird produces a sound that booms like a drum? 303
How many wings has a butterfly? 419
What insects lie beneath the ground for many years? 580
Where is coffee grown most extensively? 619
How does the power of scent aid the crow? 714
Describe the woodpecker. On what do these birds feed? 3179
What fishes kill their prey by electricity? 2897
Describe a sword fish. Where is it found? 2796, 2797
Can an auk fly rapidly? For what is it hunted? 185
Name the seven classes into which birds are divided 298
What insect is used in making scarlet colors? 614
What bird is spoken of as the most perfect of the feathered tribe? 971
Name the different kinds of fins found in fish 1000
What is a trumpet flower? Where is it cultivated? 2928
Where do we find the tarantula? Is it poisonous? 2818
What is a swift and why is it so called? 2790
What is a seal? Name some of the species 2573
Describe the ibis. Does it fly rapidly? 1356
Which is the largest bird of prey native to Europe? 1535
What animal is the largest of the cat family? 1599
Is the owl a bird of prey? For what habits is it peculiar? 2070
What fish has barbs in its fins? 506
How many nuts are borne in the prickly sack of the chestnut tree? 551
What does the name daisy mean? 742
In what respect does the voice of the male duck differ from that of the female? 837
What tropical bird is noted for its immense beak? 2902
Is the thrush a bird of song? What common bird belongs to the thrush family? 2872
What insects build large, conelike houses? 2846
Where do we find a bird that sews its nest? 2808
What kind of a mollusk is an oyster? What is an oyster catcher? 2073, 2074
What bird is typical of vainglory? State the reason 2131
What water bird has a large pouch underneath the lower mandible to store food? 2143
In what country does the deoder cedar grow? 515
What insect is associated with the fireplace of the home? 704
What kind of a root has the dandelion? 748
What is a prairie dog and why is it remarkable? 2301
From what plant is quinine secured and for what is it employed? 2356
Name a herb-eating sea mammal. Where is it found? 839
Describe a grasshopper. On what do these insects feed? 1182
How long is a guinea pig? Why are they domesticated? 1216
What are vanilla plants and for what are they useful? 3020
By what methods may strawberries be propagated? 2759
What is seed? Are some plants flowerless? 2579
In what respect do hares differ from rabbits? 1252
What animal can leap fifteen feet? 1488

What bird has a lyre-shaped tail? 1652
Can the muskrat live in water? 1882
Describe the octopus. How much do large specimens weigh? 2018
Describe the stork. Where does it build its nest? 2751
About how many dates grow on a single tree? 757
Name the largest bird of Australia 913
Do gorillas live in families? Where do they sleep? 1167
Where and how do swallows build their nests? 2784
Which bird has the longest legs in proportion to the size of its body? 2745
How high and long is a hippopotamus? Compare it in size with the elephant 1304
What birds fly so rapidly as to elude the eye? 1337
What insect holds its fore legs as if folded for prayer? 1699
Do peanuts grow in or above the ground? Where are they cultivated? 2132
What is a pineapple? How are pineapples propagated? 2218
Name the most beautiful and fragrant of flowers 2450
What animal can see as well in the dusk of the evening as in the daytime? 503
Which bird lays a larger egg than any animal now living? 879
What forage plant is widely cultivated in dry localities? 64

NOTED WOMEN

DEFINITION: The women who are prominently connected with history, literature, discoveries, and the sciences are properly classed in the list of noted women.

What Indian maiden saved the life of Captain John Smith? 2243
What famous painting of Rosa Bonheur was purchased by Cornelius Vanderbilt and placed in the Metropolitan Museum of Art, New York? 333
Tell why Jane Addams, Susan B. Anthony, and Ellen Terry are famous 20, 111, 2849
Whom and when did Abraham Lincoln marry? 1595
Who was the last queen of the Hawaiian Islands? 1591
Who was Mother Shipton and why is she noted? 2618
What empress was the most eminent opponent of Frederick the Great? 1707
Why was Grace Darling honored? 754
Name the first child born of English parents in America 753
Who instigated the massacre of Saint Bartholomew's Day? 507
Whose dying words were, "O Liberty, what crimes are committed in thy name?" 2437
How long was Mary, Queen of Scots, imprisoned? 1724
Who was Marian Evans and what did she write? 902
What authoress made speeches favorable to Greeley in 1872? 796
Who was called the "Maid of Saragossa?" 2528
Who is said to have unwound the first silkworm cocoon? 2635
When and whom did Washington marry? 3097
Who was Marie Antoinette and what was her fate? 1707
What queen bore the title of king? 575
Who was called the "Maid of Orleans?" Why? 1459
Name some of the writings of Madame de Stäel-Holstein 2720
Where was Frances E. Willard educated? 3156
Who was Queen Zenobia and when did she live? 3219
Who was known as "Gail Hamilton?" 809
What queen reigned longest in English history? When? 922, 3046
Who was Sappho? What was the purport of her writings? 2527
Who was the mother of Jesus? Mention some prominent paintings of her 1720, 1671
Who was spoken of as the "Sister of Tennyson" and the "Daughter of Shakespeare?" 385
Who delivered a famous address at the World's Columbian Exposition, and was forbidden to enter Russian territory? 1817
Name the authoress of "Adam Bede" 902
What queen was the last of the Ptolemies of Egypt? 600
Who wrote "Domestic Affections?" 1283
When was the Salic law repealed in Holland? Why? 3147
Who wrote "Uncle Tom's Cabin?" What influence did it have? 2754
What queen made an effort to restore the Byzantine Empire? 507
Why did Napoleon divorce Josephine? Whom did he afterward marry? 1472, 1895
How long did Queen Elizabeth reign? Did she ever marry? 922
What famous writer reviewed at a salary of $75 per year? 1719
Who is called the "Swedish Nightingale?" 1596
Who was Marquise de Pompadour? 2267
Name a famous letter writer and speak of her influence 2596
For what is Florence Nightingale celebrated? 1974
Name the most famous French painter of the 19th century 333
Who was Octavia? What can you say of her character? 2018
What was the immediate cause of the Trojan War? 1280
Who was the first English bride in the New England colonies? 3164
What president was instructed in writing and arithmetic by his wife? 1463

Who was Madame de Stäel-Holstein? 2720
What country of Europe is now ruled by a queen? 3147
Who was called "the Bloody Mary" and why was she so called? 1721

ORTHOGRAPHY

DEFINITION: Orthography is the division of grammar which treats of letters, syllables, and the art of spelling.

From what sources was the English alphabet derived? 76
What is Esperanto? Why is it superior to Volapük? 937, 3060
What alphabet formerly did not have the letter u? With what letter was it formerly used interchangeably? 2955
Prepare a table to show the sounds of the letter a. (See Key to Pronunciation.)
How many distinct sounds has the letter a in the English language? 1
How does a consonant differ from a vowel? 658
How many sounds has c? Give examples. When is c silent? 424
Which letter is never used as a final letter and is always followed by u? 2343
Is y always a consonant? In what language is it used instead of the pronoun I? 3198
What is the abbreviation of "which see?" 4
Is d ever silent? What number does it represent as a Roman numeral? 739
When did w come into use? What is its oldest form? When is it silent? 3067
Whence was the sound of j derived? How is it employed as a symbol? 1427
How many sounds has l and how is it uttered? 1525
What are the two sounds of s? Illustrate by giving words. When is s silent? 2479
What is Volapük? What are the advantages claimed for it? 3060
What are the first and last letters of the Greek alphabet? 76
Which is the first consonant? How is it pronounced? 202
When has h its distinctive sound? When does ch generally have the sound of k? 1227
Illustrate the long and short sounds of i. How is it used as a pronoun? 1355
When is k silent? With what letter is it interchangeable in the German? 1483
What kind of a consonant does v represent? Explain its value as a numeral 3009
How is the letter f formed? Is it an aspirate? 965
When is p silent? Is it ever silent in the middle of a word? 2076
How many sounds has o? What is its value in arithmetic? 2011
Which letter is the rarest tone? When was it adopted by the English? 3215
When is n silent, and when has it a nasal-guttural sound? 1887
How is t formed? With what letter is it closely associated? 2803
Do the alphabets of European people agree? 76
Illustrate the long sound of e. Does it occur frequently in English? 852
Exemplify the two sounds of g. When is it silent? 1082
How many sounds has r? What are the three R's? 2359
Does x represent a distinct sound? What is its sound at the beginning of a word? 3194
Classify m. What does it denote as a Roman numeral? 1654
What effect has the final e upon the preceding vowel? 852
Give two examples to illustrate the two principal sounds of i 1355
What is spelling reform? Give some examples of words that may be changed 2704

PENMANSHIP

DEFINITION: Penmanship is the art of writing, as with a pen or pencil.

Has the ability to commit thought to writing been an important factor in education? 873
Define phonography and stenography 2620
How did the alphabet originate and from what was it named? 76
Did the Assyrians have skill in writing and keeping records? 171
What materials were used for writing by the Babylonians, Assyrians, and Egyptians? 335
Explain and classify the four modes of writing used by the ancient Egyptians 1299
Who invented the Pitman system of shorthand writing? 2224
How many words can a skillful reporter write in a minute? 2620
Speak of the different kinds of typewriters. Are they used extensively? 2952
From whence was writing introduced into Europe? 3188
What is cryptography and for what purposes is it employed? 718
What were the different systems of hieroglyphic writing used by the ancients? 3188
How many characters are used in Chinese writing? 3188
Describe the two systems of writing used extensively in Canada and the United States 3188
Describe and number the principles of slant writing 3188

PHYSICS

DEFINITION: Physics is the science which treats of the laws and properties of matter, and investigates the causes that modify the general properties of matter.

Define physical science and natural science 2205
What is the meaning of *philosophy* and what does the term signify? 2195

Define and contrast the terms science and philosophy 2559
What can you say of the progress of the physical sciences prior to the 18th century?..... 2559
Explain the theory of a gas engine. What does the science of pneumatics include?....1101, 2242
Explain the process of annealing. Can the ductility of glass be changed?..... 107
Define the atomic theory and tell who originated it 180
What is the advantage of having subdivisions by tubes in steam boilers? 325
What causes smoke to pass upward in a flue or chimney? 562
Define aërostatics and aërodynamics..... 26
Explain the theory of an Archimedes' screw and tell of its use..... 132
What is a brake? Describe different kinds of brakes 359
Define and illustrate adhesion. How does it differ from chemical affinity? 22
What is color? Explain the theory of color..... 629
Can two bodies be equal in bulk and yet differ in density? 784
Define ductility and name the more important metals in the order of their ductility..... 837
What is an echo and how is it produced? What lake is noted for its echo?..... 864
Explain the air pump and tell for what purposes it is used..... 44
What is cohesion? How does it act in solids, in liquids, in gases?..... 620
What is a dynamo and upon what does its power depend? 535
Define elasticity. When and by whom was the elasticity of water discovered?..... 886
Distinguish between kinetic and potential energy. What is radiant energy?..... 915
Which is presumed to be one of the most elastic forms of matter?..... 939
What is dynamics? Of what do statics and kinetics treat? 849
How far does a body fall in a second after passing from a state of rest?..... 973
Upon what do the different colors of objects depend? 1589
What is the most common cause of expansion? Does expansion affect all substances?..... 959
Give the temperature of the flame of an alcohol lamp, of the Bunsen burner..... 657
What three things must be known in order to measure the effect of a mechanical force?.. 1030
Of what does galvanism treat and from whom was it so named?..... 1091
Explain the utility of using compressed air for the purpose of propelling machinery..... 644
Give the three primary laws of force as first stated by Newton 849
What is an electric current and how may one be formed? 891
Define extension. Is it a general property of matter? 961
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DEFINITION: The history of the United States embraces the history of the United States and its colonial possessions.

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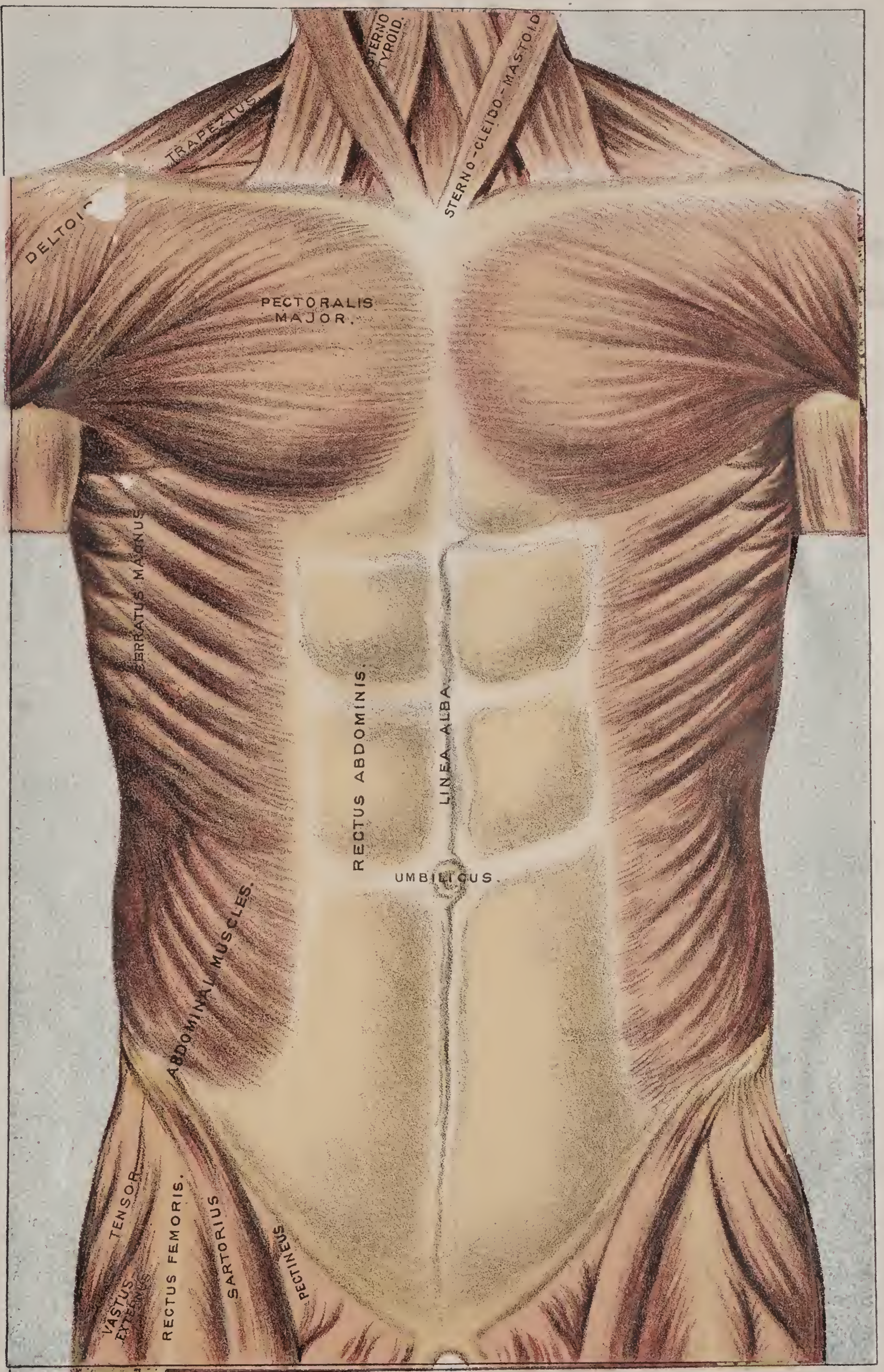
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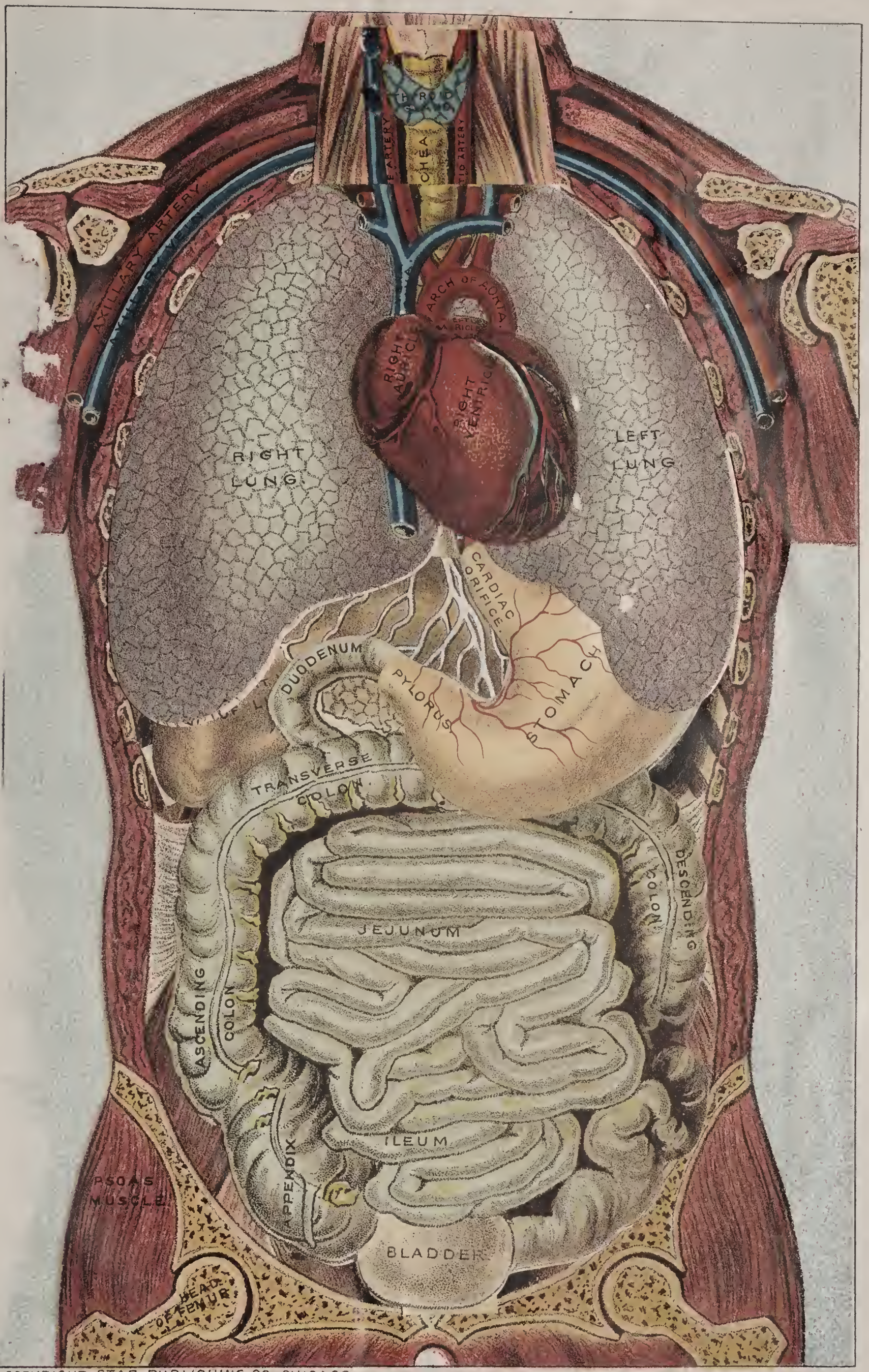
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